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Neuralgias of the Face: Diagnosis and Treatment*

ALFRED W. ADSON, M.D., F.A.C.S.
SECTION ON NEUROLOGIC SURGERY, MAYO CLINIC
ROCHESTER, MINNESOTA

THERE are two major neuralgias characterized by paroxysmal painful sensations of the face. The painful sensations may extend to the tongue, gums, throat and ears, depending on the branches of the nerve involved. The fifth cranial nerve (the trigeminal nerve) and the ninth cranial nerve (the glossopharyngeal nerve) are the nerves afflicted. Trigeminal neuralgia occurs about 75 times as frequently as does glossopharyngeal neuralgia; occasionally they appear simultaneously.

Sphenopalatine neuralgia as described by Sluder[18] may be a distinct entity, though Vail[20] preferred to refer to the syndrome as a neuritis of the vidian nerve. The pain is continuous, not paroxysmal and is localized in the maxillary region with extension along the upper four cervical nerves. The present treatment does not offer the dramatic relief that the treatment for trigeminal and glossopharyngeal neuralgias offers to those patients with the one or the other major neuralgia.

Migraine with extension of pain along the ophthalmic branch of the trigeminal nerve is an extremely painful syndrome, accompanied by lacrimation and photophobia. The attacks of pain are not paroxysmal and are not precipitated by touching the involved skin area.

Postherpetic ophthalmic neuralgia is a continuous painful sensation, distributed to the area supplied by the ophthalmic branch of the trigeminal nerve. At the onset of the disease, papules and pustules develop on the forehead, eyelids, sclera and even cornea. However, the severest pain develops after the skin lesions have healed. The area involved is extremely hypersensitive to touch.

The pains accompanying infections of the antrum and other sinuses are constant and continuous and are associated with symptoms of sepsis.

Localized dental caries gives rise to severe pain which is constant in character and is accompanied by local tenderness, signs of infection and roentgenographic evidence of the disease. These facts should be kept in mind when a patient complains of paroxysmal pain localized in a tooth without evidence of inflammation, since extraction of a tooth will not relieve trigeminal neuralgia.

Dental neuritis, an aching, burning pain in the gums following complete extraction of a tooth, occurs occasionally. It is distinguished from trigeminal neuralgia in that the pain is not paroxysmal, but continuous and usually involves both sides of the mouth. The gums remain tender, a fact which frequently prevents these patients from wearing their dentures. Localized dental neuritis also follows the nerve block which is employed to desensitize a part for a dental surgical procedure. Usually the pain and paresthesia disappear within two or three weeks. However, if anesthesia is a predominant symptom, it may continue indefinitely.

TRIGEMINAL NEURALGIA

Symptoms.—Trigeminal neuralgia is characterized by darting, stabbing, flashlike pains extending along one or more branches of the trigeminal nerve. The paroxysms of pain usually are initiated by irritation of the region involved, such as that caused by washing the face, cleaning teeth, chewing, swallowing or talking, or by exposure to currents of air. Frequently, a particular area, commonly known as the trigger zone, is more sensitive than are other areas. Patients with trigeminal neuralgia are seen to protect the painful areas by not washing the face and by not talking, smiling or even eating in an effort to prevent initiation of a paroxysm. The paroxysm may last from a few seconds to a minute or two, and is usually followed by an interval of complete relief varying from a few minutes to several hours. The disease may occur in almost any decade of life, rarely in the first decade, and is most common after the fourth decade. The attacks of paroxysmal pain at first continue perhaps only for a few weeks, with an interval of relief for months, but as time passes, the attacks are of longer duration and of greater intensity.

---

* Read before the Twelfth National Assembly, United States Chapter, International College of Surgeons, Chicago, Sept. 29-Oct. 4, 1947.

It must be borne in mind that the attacks of pain may cease spontaneously; however, if the patient should be taking treatment or drugs such as vitamins, the treatment or medication is often credited with effecting relief, when in reality cessation of pain and taking of medication have been coincidental occurrences. Injections of alcohol into the nerve branches and section of the sensory root of the gasserian ganglion are the only means which afford actual relief of pain.

Etiology and Pathology.—The specific etiologic agent in trigeminal neuralgia is still unknown. Horsley [12] once attributed the disease to an ascending neuritis following dental caries. But this theory has not been accepted since neither sensory nor motor loss occurs in the nerve involved; however, paresthesia is occasionally present. Frazier.[10] in discussing etiology and pathology of trigeminal logic factor may be a histaminic or an allergic reaction of some sort. Of course, we cannot ignore the fact that the disease is more prevalent after 40 years of age than it is prior to that age, which suggests that sclerotic changes in the vascular wall of arteries supplying certain cerebral centers have thus altered the function of the upper neurons of the trigeminal nerve. Though I have seen the disease develop simultaneously with syphilis and multiple sclerosis, the treatment of syphilis or the various treatments prescribed for multiple sclerosis have failed to change the course of trigeminal neuralgia.[2]

Palliative Treatment.—Such palliative measures as the avulsion of peripheral branches of the trigeminal nerve and introduction of screws into the infra-orbital and mandibular foramina have been discarded. The palliative treatment today consists of injections of alcohol. Occasionally, dentists and a few physicians employ the technic of injecting the peripheral branches at the infra-orbital, mandibular and supra-orbital foramina, but the injections of greatest value are the deep injections—those that are introduced where the second and third branches leave the skull. Injection into the ophthalmic branch of the trigeminal nerve is made at the supra-orbital foramen, since an attempt at injection in the orbit where the branch leaves the cranial cavity might readily affect the oculomotor nerves and produce paralysis of the oculomotor muscles. There are a few surgeons needle employed is 8 cm. in length and 1.5 cm. in diameter and is of the trocar and cannula type; the cannula is graduated in centimeters in order to indicate the depth reached.

Injection into the mandibular branch is made at its exit from the foramen ovale; this point is reached by placing the needle through the skin at a point 2.5 cm. in front of the descending root of the zygoma, which almost coincides with the anterior bony border of the external auditory meatus. The needle is directed slightly upward along the base of the skull and a little backward at a depth of 4 cm. Injection into the superior maxillary division is carried out by placing the needle through the skin 0.5 cm. posterior to the external angle of the orbit underneath the zygoma; the needle is directed horizontally toward the anteroposterior line, but it is inclined slightly upward in such a direction that it should reach the nerve at a depth of 5 cm., the point of emergence of the nerve from the foramen rotundum.

Radical Treatment.—The radical treatment consists of partial or complete section of the sensory root of the trigeminal nerve. Many surgeons have participated in the development of the technic. At present there are three accepted methods. The most favored one, and the one most widely employed, is the temporal approach, which consists of performing either a subtotal or total section of the sensory root, depending on the branches involved. There are two schools of thought concerning this procedure. One argues that it is perhaps better to do a subtotal section, especially if only the third branch is involved, even though the disease may spread to involve the second and even the first branches of the trigeminal nerve and may require a secondary operation. The other school advocates the total section of the nerve by taking extreme care not to traumatize the ophthalmic portion of the ganglion, since trauma to the ophthalmic portion gives rise to keratitis, which can be very troublesome.[1, 4]

The second procedure consists of performing a subtotal or total section of the sensory root of the fifth nerve by a suboccipital approach. Dandy[8] was an ardent supporter of this technic, arguing that if one divided the descending group of the fifth nerve, one would be able to accomplish relief of pain without producing loss of sensation over the face. This is partially correct; however, if careful examination is made it will be apparent that, while the pain sensations are diminished to a greater degree than are the tactile sensations, not all of the pain fibers have been included in the section of the descending root of the trigeminal nerve.

The third procedure is referred to as "tractotomy," as advocated by Sjöqvist.[17] It was designed with the idea of eliminating postoperative paresthesia, burning and creeping sensations that some patients complain of after a section of the sensory root. I regret to say that these sensations have not been relieved by employing tractotomy. There are probably indications for this procedure, especially when one is compelled to section other nerves in addition to the fifth, such as the ninth and part of the tenth cranial nerves, to relieve the pain of malignant disease of the mouth. Walker[21] advocated tractotomy of the brain stem at a portion just above the tentorium cerebelli, whereas the Sjöqvist tractotomy was performed on the lateral surface of the medulla. This procedure did alter the pain sensation, but extended this alteration to the opposite side of the body. The indications for this procedure are very limited.

Selection of Therapeutic Procedures.—At the Clinic we prefer to advise patients at the onset of their disease to try, as a therapeutic test, an injection of alcohol. This accomplishes two objects: First, if the patient has trigeminal neuralgia, temporary relief will be obtained. Secondly, it teaches the patient what anesthesia is like and what he must expect when the root is sectioned. If but one branch is involved, it might be wise to repeat the injection two or three times. The average duration of relief obtained from these injections is from 9 to 18 months. The first injection is more effective than the subsequent ones, but once involvement of two or more branches develops, it seems unwise or impractical to ask the patient to return for repeated injections. Furthermore, injection of alcohol into the ophthalmic branch is not too satisfactory. The injection can be effected at a point slightly proximal to the supra-orbital foramen. It is unwise to inject much, if any, alcohol deep in the orbit for fear of paralyzing the oculomotor nerves. An avulsion of the ophthalmic branch may give temporary relief, but rarely is it possible to avulse the nerve the second time: so, whenever the ophthalmic branch is involved, it is usually wise to proceed with a complete section of the sensory root.

When the patient has a history of a third or second branch involvement of rather long duration, a subtotal section of the sensory root is indicated to preserve the sensation to the cornea. A complete section of the sensory root at the primary operation avoids the necessity of secondary operations. However, when this is done, care should be employed to avoid injury to the ophthalmic portion of the ganglion. It is also necessary for these patients to wear a dust guard, which is snapped onto a pair of glasses when exposed to dust, to avoid the entrance of foreign particles into the eye on the side which has been made anesthetic by section of the root.

The sequelas that used to follow the transtemporal approach in the section of the sensory root have largely disappeared. Facial paralysis has been eliminated by avoiding traction on the great superficial petrosal nerve, which lies underneath the ganglion. This is accomplished by not elevating the ganglion or dividing the petrosal nerve lateral to the gasserian ganglion, which lies in Meckel's fossa. Meningeal hemorrhages are controlled paralysis of these muscles, for if they are paralyzed, the patient will have difficulty in wearing dentures.

Results of Treatment.—The temporary relief obtained from injections of alcohol and the permanent relief obtained by section of the sensory root is so dramatic and welcome that patients rarely complain of the discomforts of an anesthetic face which they must accept. Paresthesia, itching and burning sensations do continue in the occasional elderly patient after root section, even though the face is anesthetic to all forms of sensation. It is more noticeable in patients with low thresholds to pain. Mild sedatives offer these patients partial relief.

GLOSSOPHARYNGEAL NEURALGIA

Symptoms.—Glossopharyngeal neuralgia is a disease which resembles trigeminal neuralgia in that the pains are spasmodic, excruciating, lancinating and radiating. However, in glossopharyngeal neuralgia the pains are projected along the distribution of the ninth cranial nerve. In glossopharyngeal neuralgia the trigger zone is located in the tonsillar fossa, and the darting pains are projected toward the ear, usually terminating in the tympanum. The pains are precipitated by yawning, swallowing and talking, but they are not precipitated, as they are in trigeminal neuralgia, by rubbing the face.

Weisenburg,[22] in 1910, was the first to deporary relief had been afforded when his local physician had cocainized his throat; at this particular time, however, this phenomenon did not have a great deal of significance to me. Since the pain was severe, resembling to some degree that of trigeminal neuralgia, I believed we were justified in carrying out a radical operation on the fifth nerve; therefore, I divided the sensory root on Mar. 23. The patient received the usual anesthesia that follows division of the sensory root, but in spite of this, there was recurrence of pain when he yawned, about a week after operation. The pain continued to recur until I avulsed the glossopharyngeal nerve, extracranially, through a lateral cervical wound on Apr. 25. This gave the patient complete relief until June 10, 1924, when he had a recurrence. This led to discontinuance of the peripheral operation and to the use of intracranial nerve section proximal to the ganglions, which I proposed in June, 1924, and carried out on Nov. 6, 1925.

Etiology and Pathology.—The etiology of this disease is just as obscure as that of trigeminal neuralgia. It is rather curious that both diseases begin in middle life or later and that they both occur in cycles, with paroxysms of pain followed by intervals of complete relief. In both diseases no definite pathologic change has been demonstrated in the ganglions. Likewise, in both diseases the pain is invariably initiated by stimulation of a trigger zone. It is generally assumed that the disease is the result of some pathologic change in the ganglion itself. However, it is fair to postulate that these classic attacks of pain may be the result of some circulatory phenomenon, something akin to the periodic attacks of vasospasm seen in the peripheral arteries in Raynaud's disease.

Differential Diagnosis.—The pains resemble those of trigeminal neuralgia in their occurrence, duration, repetition and character, but they differ from those of trigeminal neuralgia in their distribution. The trigger zone is situated in the tonsillar fossa. The pains are brought on more often by yawning and swallowing than by chewing, and they cannot be brought on by rubbing the face; only occasionally are they brought on by rubbing the ear. Glossopharyngeal neuralgia also differs from trigeminal neuralgia in that the pain is projected from the tonsillar region and pharynx through to the ear, particularly to the tympanum. *In glossopharyngeal neuralgia it will be observed that cocainization of the pharynx will result in temporary cessation of all attacks, but cocainization of the pharynx will not alter the paroxysms when they are due to trigeminal neuralgia.*

Palliative Treatment.—Injection of alcohol cannot be used in the palliative treatment of glossopharyngeal neuralgia, since the ninth nerve is too intimately associated with the tenth and eleventh cranial nerves, the cervical nerves and the cervical sympathetic chain. Therefore, the only temporary procedure that has offered any palliative relief at all has been peripheral avulsion. Peripheral avulsion of the ninth nerve is a rather formidable procedure, and it is one that I have discontinued, since the intracranial procedures can be carried out without any difficulty and they assure permanent relief.

At the onset of this disease most patients are not prepared to accept a formidable operation. It is therefore necessary that patients thoroughly understand the problem. They should be told that the paroxysms of pain will return and that permanent relief can be obtained by intracranial nerve section. Sedatives, such as bromides, phenobarbital and trichlorethylene, have a tendency to decrease the severity of the attacks. It is unwise to advocate continued use of morphine. If palliative measures fail to ameliorate the symptoms, the radical procedure should be advised.

Technic of Intracranial Division of the Glossopharyngeal Nerve.—The exposure used is that of unilateral suboccipital decompression. The patient is anesthetized with ether through a Magill intratracheal tube, and is then placed on a cerebellar upright frame. A straight lateral scalp incision is employed. The skin and muscles are reflected in the same manner as for cerebellar decompression, and the bone covering the one cerebellar lobe is removed with a rongeur. The dura is incised along the outer and inferior borders of the site of decompression. If the cerebellar lobe is not displaced easily, one can drain the posterior cistern. Before elevating or displacing the cerebellar lobe, it is well to cover the dura and cortex with strips of cotton. The lobe of the cerebellum is then elevated with an illuminated retractor which exposes the seventh and eighth cranial nerves; inferior to these and slightly more superficial, the ninth, tenth and eleventh nerves will be seen entering the jugular foramen. On closer observation, the ninth and tenth nerves will be found to be short and to pass laterally from the medulla, whereas the spinal accessory nerve is longer and will be seen to enter the foramen in an oblique course from below upwards. The glossopharyngeal nerve enters the foramen at the rostral margin and is separated from the vagus nerve by a small dural band, which is less than 1 mm. in width, but which is definite enough to separate the ninth nerve from the tenth and to permit one to pass a small, right-angled ganglion knife between the fibers of the glossopharyngeal and vagus nerves, allowing for sharp section of the glossopharyngeal nerve without injury to the vagus.[8]

Surgical Results.—Pain is instantly and permanently relieved after intracranial section of the glossopharyngeal nerve. The sensations of taste on the one side of the tongue detected by the circumvallate papillae are lost. Tactile pain and thermal sense are lost in the upper half of the nasopharynx, including both sides of the soft palate and tonsillar pillars. Since the motor innervation of the stylopharyngeus muscle has been included, the soft palate will be seen to retract to the side opposite to that on which operation has been performed. Immediately after operation the patient may complain that fluids return through the nose during the act of swallowing, but he soon learns to overcome this. The patient's appreciation of the relief from pain appears to make him forget about the anesthesia, for rarely does he complain of any discomfort.

the neck. This pain differs from that of trigeminal neuralgia in that it is more or less constant; it is not paroxysmal and is moderately severe, but it is not sufficiently severe to incapacitate the patient unless he is of neurotic temperament, in which case the pain is always greatly accentuated and incapacitating. Neither deep injection of alcohol into the branches of the trigeminal nerve nor division of the sensory root affords relief in treatment of this type; as a matter of fact, the condition is aggravated by the numbness that follows section of the sensory root of the trigeminal neuralgia.

The local treatment advocated by Sluder consisted of an injection of alcohol and phenol into the region of the sphenopalatine ganglion, accomplished by injecting them through the wall of the nose under the middle turbinate. Others have advocated the use of solutions of silver nitrate, applying pledgets soaked in silver nitrate to the nasal mucous membrane underneath the middle turbinate. Vail suggested, as a therapeutic test, the use of procaine introduced into the sphenoidal sinus. If this gave temporary relief, he advocated unroofing the sphenoidal sinus in order to make applications of alcohol directly to the floor of the sinus, since it was his opinion that there is a dehiscence in the vidian canal which exposes the vidian nerve to infections of the sphenoidal sinus. Of late, administration of vitamins, especially niacin, has become a favored treatment. I personally must confess that I am not too sure that a true syndrome exists. If it does exist, I am not too sure about the results obtained by treatment.

OPHTHALMIC MIGRAINE

Surgery has offered little in the control of this syndrome. Resection of the superior cervical sympathetic ganglion, as well as periarterial sympathectomy of the internal carotid, have been performed. Neither of these are too effective in relieving the pain. In a few instances with evidence of cranial trauma, I have opened the middle fossa of the skull, ligated and resected a portion of the middle meningeal artery and applied alcohol to the dura within the middle and anterior fossae with the hope of destroying the sensory fibers that ultimately communicate with the fifth nerve. The results again are rather indeterminate. Two or three have obtained satisfactory results, while others have not obtained relief. Medications such as ergotamine tartrate or similar compounds have afforded some relief. Histamine therapy has still not been very effective. Much work is required before this syndrome is thoroughly understood and relief can be assured these people.

POSTHERPETIC OPHTHALMIC NEURALGIA

I regret that there is no specific cure for this pain. I have avulsed the ophthalmic branch; this procedure does offer some palliative relief in that it desensitizes the scalp and permits the patient to wear a hat or cap and to wash his face without aggravating the pain. I have also completely sectioned the sensory root of the fifth cranial nerve, which has failed to give relief.

OTHER PAINFUL CONDITIONS OF THE FACE

In discussing the subject of neuralgias of the face, it is perhaps unnecessary to comment on the treatment of these other lesions It is rather obvious, of course, that infections of the sinuses and the antrum should be recognized early and that appropriate treatment should be administered. Dental neuritis in senile patients is a rather troublesome affair and unfortunately one not readily relieved We have given injections of alcohol into the mandibular branch of the trigeminal nerve without securing relief. Sedatives such as bromides or small doses of phenobarbital decrease the nervousness. Often, improvement of the general health by appropriate dietary regimens ameliorates the complaint. The localized dental neuritis that follows procaine block injections undoubtedly is due to the excessive amount of procaine injected into the immediate vicinity of the nerve. The symptoms of paresthesia usually disappear, and no specific treatment is indicated or of value. The patient who complains about the paresthesia that follows a nerve block probably would complain more of the numbness that results from either injection of alcohol or subtotal section of the sensory root. Therefore, we have never felt justified in advising employment of these operative measures.

SUMMARY

Painful sensations about the face, mouth and throat are very distressing, and the major neuralgias, trigeminal and glossopharyngeal neuralgias, can become so severe as to incapacitate the patient totally. The other painful lesions of the face, as a rule, are not as severe. Their constant and continuous presence disturbs the nervous system so that sooner or later the patient will become neurotic, maladjusted and a chronic invalid.

Since complete relief can be obtained for those with the major neuralgias, it is extremely important to make an accurate diagnosis, to distinguish one from the other and to distinguish them from other lesions which produce painful sensations of the face.

Though Sluder's sphenopalatine neuralgia, ophthalmic migraine and postherpetic ophthalmic neuritis are not thoroughly understood, moderate relief can be secured; however, it is hoped that further investigation will bring forth measures of relief as effective as those for the major neuralgias.

RÉSUMÉ

Les sensations douloureuses de la face, de la bouche et de la gorge son très accablantes et les névralgies, trigéminales et glossopharyngeáles peuvent devenir si sévères que le malade est tout à fait incapable de suivre aucune occupation. Les autres lésions douloureuses de la face sont généralement, moins sévères. Leur présence constante et continue dérange le système nerveux et tôt ou tard, le malade devient un nevrose, un déplacé et un invalide chronique.

Vu qu'un soulagement complet peut être obtenu dans les névralgies majeures, il est d'une extrême importance de faire un diagnostique exact, de distinguer leurs différentes origines et de les différencier des différentes lésions douloureuses de la face.

Quoique la neuralgie sphénopalatine de Sluder, la migraine ophthalmique et la névrite ophthalmique postherpétique demandent encore beaucoup à être étudiées, on peut obtenir dans ces conditions un soulagement modéré.

Il est à espérer que des recherches approfondies futures nous [illegible] en [illegible] de moyens pour le soulagement aussi [illegible] que ceux que nous possédons pour le traitement des névralgies majeures.

SOMMARIO

Nevralgie del trigemino e del glossofaringeo possono divenire cosi' intollerabili, da rendere il paziente un neurotico ed un invalido. Altre lesioni della faccia non sono—in genere—così dolorose. Dato che le nevralgie possono essere curate efficacemente, e' estremamente importante un' esatta diagnosi differenziale dalle altre lesioni che possono provocare sensazioni dolorose della faccia, della bocca e della gola. Benchè altre condizione dolorose, come le nevralgie sfenopalatine di Sluder, le emicranie oftalmiche e le neuriti oftalmiche posterpetiche, non siano ancora bene interpretate, un certo sollievo puo' essere ottenuto con una terapia appropriata. E' sperabile communque, che ulteriori ricerche possano condurre alla scoperta di cure altrettanto efficaci quanto nelle tipiche nevralgie.

RESUMEN

Las neuralgias del nervio trigemino y del glosofaringeo a veces son tan severas que llegan a incapacitar totalmente al paciente y cuando son cronicas producen tarde o temprano disfunciones del sistema nervioso con neurosis e invalidismo.

Por razon de que se puede obtener el alivio completo del syndrome doloroso en las neuralgias mayores por el tratamiento moderno es muy importante el diagnostico diferencial de estas neuralgias de las otras lesiones dolorosas de la cara boca y faringe.

Aunque todavia no se comprende bien el mecanismo de ciertas neuralgias como la neuralgia esfenopalatina de Sluder, la oftalmica migranosa, o la neuritis oftalmica postherpetica el tratamiento puede dar en ellas un alivio moderado; sin embargo, hay la esperanza de que la investigacion en el futuro desarrolle medidas que den un alivio completo en estas neuralgias mencionadas.

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Uterine Bleeding with Special Reference to the Functional Type*

EMIL NOVAK, M.D., F.A.C.S.
BALTIMORE, MARYLAND

A COMPLETE consideration of all aspects of the subject of uterine bleeding would be almost equivalent to writing a textbook on gynecology, since this symptom appears in a larger proportion of gynecologic lesions and disorders than does any other. This report will be limited to a brief generalizing discussion of types and mechanisms, with a somewhat fuller consideration of the functional variety of bleeding, simply because of the greater interest which this common disorder may have for both general practitioners and specialists.

It is of interest to recall that normal menstruation is itself a uterine bleeding, being often alluded to as the only instance of hemorrhage as a normal, physiologic phenomenon. This is not strictly true, as at least one other tissue, the lutein layer of the corpus luteum in its so-called vascularization phase, normally exhibits hemorrhage into the cavity of the corpus luteum. The pathologic physiology of the menstrual mechanism must obviously be the point of departure in any discussion of functional types of bleeding, and this subject will be commented upon later.

On the other hand, in perhaps the largest and sometimes the gravest group of cases, the bleeding is not in any way related to the menstrual mechanism, being explained by the presence somewhere in the pelvic apparatus of very tangible anatomic lesions of one sort or another. The bleeding in such cases is readily explicable without invoking physiologic factors, often by such obvious factors as the actual opening of blood vessels by destructive ulceration. This is preeminently the case in the most important, because the most serious, variety of all, that associated with malignancy located in any part of the genital tract. The genital hemorrhage in such cases is just as simply explained as is the gastric hemorrhage with gastric cancer, or the hematuria with cancer of the bladder or kidney.

Equally simple is the explanation with such benign lesions as polyps, either cervical or endometrial. Whether or not they cause bleeding depends upon whether or not the surface is lost and blood vessels opened through trauma or necrosis. Similar factors explain the occasional bleeding, often of so-called contact type, in some cases of cervical erosion.

With the bleeding often seen with myomas the explanation cannot be so stereotyped, as various mechanisms may come into play. The fact that the submucous variety of myoma is especially likely to cause bleeding seems explicable by the frequency with which the overlying endometrium undergoes atrophy, infection and ulceration, as well as by the greater impingement upon the endometrial venous channels, from which such bleeding has its source. But bleeding may also be noted with intramural growths, and probably here we must include an effect upon the contractility of the uterine musculature, a factor which many believe is of importance even in the limitation of normal menstrual bleeding. This same factor may be concerned in the menorrhagia not infrequently seen with subinvolution of the uterus, especially when associated with marked retrodisplacement, in which case an additional factor may be the venous congestion so often associated.

In one of the most common of all causes of uterine bleeding, that associated with retention of gestational products after abortion or full term delivery, the mechanism is not always the same. Here again the factor of lessened muscular contractility is no doubt sometimes involved, but certainly not always. Free bleeding may be noted from a well contracted uterus many weeks after an early abortion, while in other cases a uterus may be large and boggy, with its cavity full of placental tissue, and with no bleeding at all for even weeks. In such cases the bleeding may occur when the uterus finally tries to expel its contents, with opening up of large sinuses, just as the surgeon, in evacuating such retained masses, produces free bleeding when he separates such retained masses from the uterine wall. Other possible factors in the bleeding of incomplete abortion are those due to the loss of endometrial surface and the opening of blood vessels, associated inflammation and necrosis.

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When it comes to the bleeding associated with adnexitis, we cannot always so readily offer rational explanations. The endometrium in most such cases is histologically normal, and yet, in at least some cases, there may be a shortening of the menstrual interval (polymenorrhea) or an increased menstrual amount (hypermenorrhea). The logical explanation, but one which is not easily demonstrable, is that an ovarian dysfunction is associated with, and possibly engendered by, the pelvic pathologic process. This same factor may be at play in the polymenorrhea or hypermenorrhea not infrequent with myoma. For that matter, we cannot exclude consideration of the reciprocal relationship which exists between the ovary and the uterus. One is accustomed to think of the ovaries, through their hormones, as dominating the physiologic lift of the uterus, but there is substantial evidence that the relationship of the two organs is not one-sided, and that the uterus, in some still unknown fashion, exerts a reciprocal effect upon the ovaries. Some have even postulated an endometrial hormone, but the many studies on this point have thus far yielded negative results.

physiologic etiology much more clearly and understandably. For example, the postmenopausal pseudomenstrual bleeding, characterizing granulosa cell ovarian tumor, is certainly not the result of the mere presence of the tumor, especially as other types of even large ovarian tumors are not ordinarily characterized by uterine bleeding. Again, the bleeding so characteristic of tubal pregnancy is commonly endometrial in origin. It is not due to the presence of the usually small tubal mass, but to certain hormonal influences emanating from the tubal trophoblast. And these examples might be multiplied.

The major portion of this paper will be devoted to the type of bleeding which occurs in the entire absence of any structural disease in any part of the pelvic apparatus. If such anatomic lesions exist, they are either purely coincidental or secondary to the functional disorder. By secondary changes I mean certain endometrial changes, such as hyperplasia, seen in cases of this group and produced by the functional factor. They are not only secondary to the latter, but in themselves have nothing to do with the production of bleeding.

In trying to explain this large and important group of so-called functional bleeding cases, it is obvious that we are absolutely dependent upon our concepts of the normal mechanism of menstruation. While a tremendous amount has been learned about menstrual physiology in our own generation, there are still wide gaps in our knowledge, and some of these, unfortunately, exist at the very points which bear on the point of vascular participation, so directly concerned in the explanation of functional bleeding.

I do not believe it necessary here to review historically the earlier concepts as to the etiology of functional bleeding. Nor does it seem necessary to elaborate on the clinical characteristics of this disorder, as these are well enough known. The general practitioner knows that the bleeding may be menorrhagic or metrorrhagic in character, that it may be moderate or extremely profuse or even exsanguinating. He also knows that this form of bleeding is most characteristically observed at the two extremes of menstrual life, but that it may occur at any period of reproductive life. This last statement, however, deserves emphasis because of its bearing on the matter of etiology, as will be developed later.

Nor is this the place for any complete discussion of the normal menstrual mechanism. Most of what we know of this rather intricate machinery pertains to its endocrinology, and on this point our knowledge, though still far from complete, is certainly far more advanced than it is on other important cogs in the menstrual machinery. We know much about the role of the ovarian and pituitary hormones, and about the menstrual histology of both the uterus and the ovary, but we are still woefully lacking in our knowledge of the vascular behavior of the endometrium, so obviously important in the explanation of such a vascular phenomenon as menstrual bleeding, physiologic or pathologic. Indeed, we knew nothing on this point until the comparatively recent anatomic studies of Daron, and Okkels and Engle, on the blood supply of the endometrium, and the even more important and more recent studies of Markee on the behavior of the spiral arterioles throughout the menstrual cycle.

While Markee has thrown much light on the latter subject, there is still much to learn on certain points, which are of obvious importance to our present problem of pathologic bleeding. Fundamental though the endocrines undoubtedly are in the production of the vascular changes, there are certain secondary or intermediate factors in the actual production of menstrual bleeding. During the past few years there has been a tendency to attribute more and more importance to the role of toxic endometrial factors in the production of the blood vessel changes responsible for the bleeding. Markee himself speaks of a necrosin-like product, produced by endometrial regression and possibly important in the production of the bleeding. Smith speaks of this necrotic product as an euglobulin, and likewise ascribes to it a directly causative role in the production of bleeding. However, he goes much further than Markee, in that he suggests that this toxic factor may exert an important role upon the pituitary hormones, so that it plays an integral part in the physiology of the cycle. As to the rather intricate theory of menstruation which he has thus elaborated, I believe it must still be considered rather hypothetical. For that matter, the simple concept that a toxic factor is the immediate cause of menstrual bleeding cannot yet be considered as established, in spite of the promising nature of such investigations. Certainly, however, the evidence on this point is no weaker than the assumption of some extra-ovarian hormonal factor, probably pituitary in origin, which other observers have suggested.

It is obvious that this one point of uncertainty in itself has a direct bearing on any attempt to explain the disordered menstrual mechanism which characterizes functional bleeding.

Whatever the underlying factor in bleeding, certain general principles appear to have crystallized: (1) that an endometrium which is receiving a steady supply of its supporting hormones, either estrogen alone or estrogen and progesterone, has no tendency to bleed; (2) that withdrawal or abrupt drops in the level of these hormones produce endometrial regressions of various degrees, often with bleeding as clinical manifestation; (3) that such drops in hormonal level are brought about by the reciprocal nature of the relationship between the pituitary and the ovaries.

Since our premise has been that functional bleeding is produced by aberration of the normal menstrual mechanism, it is of fundamental importance to recognize that the mechanism of the menstrual cycle is not always the same. I am well aware of the differences in opinion which exist as to the correctness or incorrectness of applying the designation of menstruation to the not infrequent anovulatory cycles which are associated with periodic bleeding, which may clinically, from the standpoint of rhythm and amount, be indistinguishable from the menstruation characterizing the far more common ovulatory type of cycle. This controversy need not concern us here, so long as we recognize that both ovulatory and anovulatory cycles do actually occur in the human female. Moreover, we do not need to inject the question here as to the numerical incidence of anovulatory cycles, even if there were any unimpeachable data on this point. That they occur frequently in the initial months or even years of menstrual life, as well as in the terminal months or years, is accepted by all, though it is also recognized that they may occur at any phase of menstrual life. The point to emphasize is that their age incidence corresponds exactly with that of the most common type of functional bleeding.

Speaking generally, either the common ovulatory or the less common anovulatory cycle may undergo aberration, with the production of functional bleeding. The latter is apparently more imperfect, incomplete and unstable, so that the proportionate incidence of disorders of this type of mechanism is far higher than with the more stable ovulatory variety of cycle. This distinction appears to furnish a rational basis for dividing our cases of functional bleeding into two groups: (1) ovulatory functional bleeding and (2) anovulatory functional bleeding.

Ovulatory Functional Bleeding.—We know much less as to the mechanism in this type than we do about the second variety. It is in cases of this ovulatory group that endometrial biopsy or curettage, if done at the appropriate time, yields a secretory and perhaps fully progestational type of endometrium. Both estrogen and progesterone are produced by the ovary, and there is at least no histologic evidence to indicate any quantitative imbalance between the two. That there is no such imbalance, or that some abnormality of estrogen partition does not exist, cannot be certain, even though there is no evidence on this point. However, it is perhaps more likely that one of the other cogs in the menstrual machinery, perhaps the spiral arteriolar mechanism or the uterine musculature, is at fault, but I know of no worthwhile evidence of primary pituitary origin. The mechanism of this bleeding has been described many times by many authors, and is at least briefly summarized in my own recent review of the subject, previously alluded to. Suffice it here to say that the endometrium in such cases is subjected to an abnormally persistent and perhaps excessive stimulation, in the entire absence of progesterone, so that it is always of proliferative, nonsecretory type.

In some cases this persistent estrogen effect brings about the exaggerated growth picture in the endometrium which is called hyperplasia, with its characteristically Swiss cheese gland pattern. In other cases the growth effect is far less pronounced, so that the endometrium resembles that characteristic of the postmenstrual or early interval phase, or it may actually be atrophic. The degree of sensitivity or refractoriness of the individual endometrium to estrogenic stimulation may play an important part in these variations. However, with any of these endometrial patterns, functional bleeding may be associated, so that there is now general acceptance of the dictum that such bleeding may be seen with any endometrial pattern, whether proliferative or, if we add the ovulatory type, progestational as well.

It cannot be too strongly emphasized that, while the bleeding is of endometrial source, the endometrium itself has nothing to do with its production. Hyperplasia of the endometrium, for example, may be of extreme polypoid type, but it is simply an expression of the exaggerated growth effect of estrogen on the particular endometrium. But the bleeding must be explained by some other factor, and clearly this must be mediated through the vascular apparatus. In other words, we must not forget that we have to deal with a vascular cycle as well as a growth cycle in the endometrium, that they do not always go hand in hand, and that in functional bleeding it is a disturbance of the vascular cycle which is apparently more important than any more readily demonstrable histologic change in the endometrium.

From what we know, or think we know, of the physiology of normal menstruation, the participating role of the pituitary cannot be excluded from consideration of the bleeding mechanism any more than it can from a fundamental role in the histologic cycle. What part local factors, such as the so-called "toxic principle," play in abnormal bleeding is even less clear than its possible role in normal menstrual bleeding. It may be pointed out, however, that regressive tissue changes in the endometrium are far less marked in anovulatory cycles than in those of ovulatory type, associated as the latter are with rather massive tissue necrosis and desquamation. And yet functional anovulatory bleeding is much more profuse than normal menstruation. This represents a purely clinical reaction to what is probably a primarily laboratory problem, but it may not be lacking in pertinence.

It seems to me that there is much need of study of the vascular behavior in the anovulatory type of cycle. So far as I know, there are available thus far only the small group of observations made on monkeys by Markee, who concluded that the vascular phenomena of the anovulatory cycle was quite similar to that of the ovulatory.

MANAGEMENT

The management of functional bleeding must depend not only on the severity of the disorder, but even more on the age of the patient and the importance or unimportance of preserving the reproductive function. It should be remembered that anovulatory cycles may occur in women who menstruate with at least approximate normality, both as to rhythm and amount. With anovulatory cycles all degrees of menstrual excess may be noted, varying from moderate menorrhagia to the most profuse flooding. It is relatively common to observe moderate menorrhagia in young girls during the initial anovulatory cycles, often associated with abnormally long intervals. Such patients, after perhaps a year or more, begin to ovulate, and menstruation becomes normal without treatment and often without medical consultation.

Similar spontaneous cure is even more frequent in the premenopausal years. We teach women, and very properly, that excessive menstruation at this time of life should never be disregarded. But the fact remains that not a few women do have moderate functional menorrhagia, that through ignorance or general apathy medical advice is not sought, and that with the cessation of ovarian function the menstrual bleeding comes to an end.

But in many women of this age group the bleeding is so profuse that the advice of the physician is sought. His first task, ordinarily mediated through the gynecologist, is to determine that the bleeding is actually functional. If careful and thorough examination shows the pelvic organs to be entirely normal from a gross standpoint and the bleeding to be of intra-uterine origin, the clear indication is for diagnostic curettage. Should this reveal no evidence of more serious lesions, but yield only a normal endometrium in any proliferative stage, or a benign hyperplasia, or for that matter a definitely secretory one, a diagnosis of functional bleeding is justified.

Once this is settled, the further management in women close to the normal menopausal age is simple. In not a few cases the curettage itself appears to suffice, and often, especially in women at or beyond the average menopausal age, one feels justified in marking time and letting the menstrual function disappear normally. In a large proportion, however, the ovarian dysfunction continues, and menstrual excess soon recurs. Since in such women the preservation of menstrual and reproductive function is no longer important, the obvious plan is to abolish it by adequate radiotherapy, which is successful in just about 100 per cent of patients.

It would be foolish to subject a woman of 47 or 48 to the annoyance and uncertainty of organotherapy. Her one desire is to get well and stay well of the disagreeable bleeding. Even at this age a few women may hesitate about the induction of an artificial menopause, because of wrong ideas that it might be more severe than a normal one. Practically always, however, a simple reassuring explanation will suffice to dissipate these misgivings. Where the bleeding has been very severe, it is usually wise to proceed with radiotherapy after the curettage, without the expectant treatment which is justified in at least some of the milder forms. The general plan, in other words, calls for individualization, the patient's own mental attitude and the degree of cooperativeness being influencing factors.

Menopausal functional bleeding, therefore, does not in itself justify hysterectomy, and every gynecologist will endorse this statement. And yet every one knows that this principle has been many times violated. If there is present some other condition, such for example as a troublesome ventral hernia, which makes laparotomy advisable, certainly there can be no criticism of including hysterectomy as a part of the procedure. Again, one not infrequently encounters patients at a border-line age, raising the question of whether it is better to remove the uterus and preserve ovarian function for five or six more years, or whether to abolish ovarian function and spare the patient even the slight hazard of a hysterectomy.

I do not think that inflexible rules can be laid down on this point. While my own tendency is toward the employment of radiotherapy after the age of 40. I appreciate that some might wish to put the age limit somewhat higher, and that the individual circumstances of the case would not infrequently lead some of us to depart from any general policy. Here I mean, of course, the more or less intractable, usually recurrent cases which have failed to respond to organotherapy.

When functional bleeding becomes a problem in the very early years of menstrual life, curettage is not usually imperative for purely diagnostic purposes. If a simple pelvic examination shows normal organs, the functional nature of the bleeding can ordinarily be safely assumed. However, a curettage is often indicated for therapeutic purposes, since it is the quickest way to stop the bleeding, temporarily at least. It is scarcely necessary to emphasize the importance of hematinic therapy, often including transfusions.

the still hazy subject of the nature of utero-ovarian coordination.

Unfortunately, in a large proportion of these very young patients, recurrence of bleeding takes place; the same thing is true in patients considerably older, but in whom preservation of ovarian function is of great importance. It is in these that we must resort to the still rather unsatisfactory organotherapy which we have available. From what has been said, it is apparent that the mechanism of functional bleeding is not always the same, and yet, in the practical treatment of the disorder, the tendency has been to put all cases into one mould, and to treat the disorder as if it were a single entity. This may not be a very serious flaw, since there is some reason to believe that the important immediate factor in the bleeding of all cases is probably that of hormone withdrawal from endometrium. Nor is it imperative, in the present status of therapy, to subject every patient to endometrial or hormone studies, because we have not as yet reached that stage of refinement in our knowledge which permits of selecting special plans for special histologic or hormonal types.

Most of our present endocrine treatments are superficial in that they try to correct the ovarian hormonal manifestations of what is primarily a pituitary disorder. This is certainly true of the plans employing progesterone and estrogen. An exception may be noted as to the so-called cyclic plans of therapy, in which an effort is made at hormonal reproduction of a menstrual cycle in the endometrium with the idea that the pituitary can be, as it were, beaten into a cyclic submission. Although good results have been reported by some, they are far from infallible, at least in my own hands. Furthermore, if I may be permitted a purely personal opinion, this idea behind such therapy does not appear to me to be very sound. It is the pituitary which is really the sick gland, and it is questionable whether it can be made to react normally simply by artificially mimicking an endometrial cycle.

If it could, we should be able to correct the common pituitary type of amenorrhea by similar estrogen-progesterone treatment of the endometrium, but no gynecologist who has many times tried such substitutional therapy can be enthusiastic about its results. In the same way, if the pituitary were always responsive to the administration of ovarian hormones we should be able to make our nonovulating women ovulate by simple administration of progesterone at or just before the usual ovulation time. As one who has in past years experimented with this plan, I can testify that it is ineffective.

These remarks are certainly not set down in a hypercritical spirit, and surely I have no plan to offer which will yield any better results than those of the excellent investigators who have sponsored these cyclic methods of therapy. But there are certainly plans which are far simpler and far less expensive to the patient than the rather elaborate rituals, often extending over months, involved in the cyclic plans. It is not flippant to say that some patients will conclude that such treatment is almost worse than the disease.

The fact remains that most patients with functional bleeding can be kept within reasonable bleeding limits, so to speak, with much simpler methods, with always the extenuation that the tendency in most patients is toward readjustment of the endocrine mechanism after a variable but unpredictable time. The hormonal preparations available are those representing chorionic gonadotrophic hormone, progesterone, testosterone and estrogen. The details of their employment would stretch this paper to inconsiderate lengths, and they are included in my recent review on the subject, as is a complete bibliography.

The progesterone plan is simple but expensive, and it is helpful only in a fraction of the cases. In my experience testosterone therapy is more often effective, and I see no disadvantage, practical or theoretical, to its employment, in spite of the protests of some that it is "unphysiologic." Since androgenic principles are normally present in the blood of women during reproductive life, since there is such close chemical kinship between the male and female sex hormones, and since it is not even impossible that these androgenic factors play some physiologic role in the life of the woman, there is nothing unsound in their therapeutic employment, especially since they represent about the closest approach available to an anti-estrogenic effect. Nor should there be any hazard of hirsutism or other masculinization effects if they are used in amounts not over 200 mg. or better 150 mg. per month.

Since the bleeding phases seem to be primarily due to drops in estrogen level, it is not surprising that the estrogens are now widely employed in the management of functional bleeding. For immediate control of bleeding, they are unquestionably of greater value than any other hormone, large oral doses of one of the oral estrogens, usually diethylstilbestrol, being used. But for any prolonged effect the dose must be juggled according to the developments of the case, being gradually decreased if the initial large doses have controlled the bleeding, and again increased if the bleeding again becomes profuse. Or the estrogen may be combined with progesterone in any one of the so-called cyclic methods of therapy.

The psychologic management of functional bleeding cases is of great importance. The patient's cooperation is most likely to be obtained if the physician explains to the patient, or to her mother, that she may be in for a disagreeable bleeding career of unpredictable duration, but that, with few exceptions, she will sooner or later undergo a readjustment of the endocrine mechanism with establishment of reasonably normal menstrual function. Her cooperation is all the more certain if she understands that the doctor's efforts at conservative management, uncertain though they may be, are motivated by his desire to avoid the radical measures which are always effective, but for which the young patient would pay the heavy price of sacrifice of her procreative function.

SUMMARY

This report summarizes briefly the mechanism of abnormal uterine bleeding associated with various structural lesions in the pelvic organs, but is devoted chiefly to the purely functional variety. The latter is due to a pathologic physiologic aberration of either the common ovulatory cycle or, much more frequently, of the less common but less stable anovulatory cycle. The mechanism of both varieties has been briefly reviewed, with a

short summary of the principles of treatment. The management of functional bleeding in the younger age groups, in which one cannot resort to easy abolition of menstrual function which is always effective, still leaves much to be desired. Most methods of treatment are superficial in that we do not as yet have any precise way of correcting the pituitary dysfunction, the fundamental cause of this menstrual disorder.

RÉSUMÉ

Les hémorrhagies uterines avec référence spéciale au type fonctionelle, le rapport résume brièvement le mécanisme de l'hémorrhagie utérine anormale accompagnant différentes lésions structurelles des organes pelviens, mais étudie principalement les hémorrhagies d'origine purement fonctionelle. Ces dernières sont dues à une aberration pathologique du cycle ovulatoire ordinaire ou moins fréquement, au cycle moins stable anóvulatoire. Le mécanisme de ces deux variétés est passé en revue et est accompagné d'un court sommaire des principes à observer dans le traitement de ces deux conditions. Le traitemen de l'hémorrhagie fonctionnelle chez les jeunes, à moins, qu'on dit recours à l'abolition complète de la fonction menstruelle, condition facilement obtenue, laisse beaucoup à désirer. La cause fondamentale de ce désdésordre menstruel n'est pas connue, et vu que nous ne possédons pas actuellement, de moyens précis pour corriger la dysfunction pituitaire toutes les méthodes de traitement que nous employons, sont superficielles.

SOMMARIO

L'articolo riassume il meccanismo delle anomalie mestruali dovute a lesione variate degli organi pelvici, ma piu' specialmente a lesioni puramente funzionali dell'ovaio. Le varieta' funzionali sono legate ad anomalie fisio-patologiche del comune ciclo ovulatorio, sia—piu' frequentemente—di quello anovulatorio. L'A. passa in rivista il meccanismo fisio-patologico di ambedue le varieta', accennando infine ai principi che dovrebbero informare la terapia.

Il trattamento delle menorragie funzionali nelle donne giovani lascia ancora molto a desiderare, perche' in questo gruppo di casi la castrazione non rappresenta una terapia consigliabile. Non avendo alcun metodo e disposizione per correggere efficacemente a definitivamente la disfunzione ipofisaria, che rappresenterebbe secondo L'A. la causa principale di queste menorragie, tutte le diverse forme di terapia offrono risultati superficiali ed incostanti.

RESUMEN

El autor hace un sumario del mecanismo productor de las hemorragias uterinas en las lesiones organicas de los diferentes organos pelvinos, pero se dedica especialmente a discutir las que se deben a desarreglos funcionales. Las hemorragias funcionales se deben muy frecuentemente a aberraciones fisiopatologicas del ciclo ovulatorio y ocasionalmente al ciclo anovulatorio; discute el mecanismo productor de estos ciclos y hace un resumen de sutratamiento. En las muy jovenes el tratamiento de las hemorragias funcionales es muy superficial por cuanto, practicamente, no se puede recurrir a la abolicion de la menstruacion y por cuanto no hay aun metodos precisos para corregir la disfuncion pituitarica que es la causa fundamental de estos desarreglos.

Management of Surgical Lesions of the Left Colon*

CURTICE ROSSER, M.D., F.A.C.S., F.I.C.S.
DALLAS, TEXAS

"IT behooves us as surgeons," said Joseph Mathews in 1895, "occasionally to take a breathing spell and look backward over the field, if not over the dead."[1]

It is with somewhat this thought in mind that I have reviewed a segment of our recent surgical work. While it is difficult to eliminate entirely statistical references, my purpose is not primarily to present conclusions based on numerical data, but to select individual cases or groups of cases which illustrate the diagnostic problems encountered, the constantly changing trends associated with the management of lesions of the large bowel and practcial points gained from our own experience.

Necessity for differentiation between the tumefaction produced by peridiverticulitis and cancer is more constantly encountered and more difficult to resolve than that between any other two conditions affecting the left colon. A decade ago, when it was assumed that the presence of diverticula eliminated neoplasm or that bleeding from the bowel was never caused by diverticulitis, the diagnostic problem seemed simpler. I recorded the observation eight years ago that one half of the patients seen by us, whose sole lesion was diverticulitis, passed blood from the bowel, either spontaneous, massive and dark or slight in amount and appearing periodically, mixed with the stool or with mucus. In the same publication[2] Cuthbert Dukes of London was quoted as finding that in 12 per cent of a series of 100 cases of carcinoma of the colon and rectum the bowel also was the site of diverticulosis or diverticulitis. Both of these observations have been confirmed by numerous investigators.

Careful inspection through the sigmoidoscope and the "typical" findings of either disease elicited by means of the double contrast roentgenogram of the colon will permit an accurate diagnosis in many cases, certainly not in all.

A white woman, 49, had expelled blood and mucus frequently for several years. For the past six months recurrent abdominal cramping, obstipation and high fever had been present. Three months before she was seen by us, a pelvic abscess was drained through the cul-de-sac of Douglas. Digital and proctoscopic examination disclosed a large, smooth, fixed mass in the lower left quadrant. The roentgenogram revealed a constricting deformity, 5 cm. long, in the lower sigmoid and multiple sigmoid diverticula. The roentgenologist stated that, while it was difficult to determine whether the constriction was inflammatory or neoplastic, history of abscess and presence of diverticula favored the first theory. Exploration of the abdomen also failed to offer conclusive evidence. A left transverse colostomy was done and one month later the sigmoidoscope was again introduced; sufficient change had occurred in the mass to permit visualization, at a higher level, of a bit of abnormal tissue, shown by biopsy to be adenocarcinoma, Grade III.

While in only 1 per cent of persons with abdominal endometriosis does the lesion infiltrate the sigmoid or rectum, few surgeons will escape removing an endometrial involvement of the left colon under the impression that they are dealing with a malignant tumor as, when endometrical invasion of the bowel does occur, it frequently causes a constriction definitely simulating adenocarcinoma.

The usual history in such cases describes a female, 30–45 years of age, who has not recently given birth to a child and whose chief complaints are gradually increasing constipation and a dull pain in the left lower quadrant, increased during the menstrual period. Involvement through the mucosa is absent or late and bleeding consequently infrequent. Such invasion of the upper rectum or the sigmoid by endometrial cells deposited on the serosa by retrograde menstruation may present a serious diagnostic problem. Proctoscopic examination is usually negative, again because the mucosa is not involved. However, 12 years ago I resected an annular constricting tumor of the upper rectosigmoid in a bowel showing definite evidence of mucosal ulceration when visualized. Since the lesion was obstructive and since the bowel was anastomosed, there was no chagrin when the subsequent pathologic diagnosis of endometriosis was recorded.

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Among the cases being reviewed, I encountered an annular, constricting and dimpled lesion in a woman, 44. The presence of diverticulosis, revealed by x-ray, further complicated the diagnostic picture. The lesion was removed and an end-to-end anastomosis done, the clinical diagnosis being adenocarcinoma. The description of the macroscopic findings was: "The external surface of the resected portion of sigmoid shows a scarred area with a folding in of the serosa and adhesion of the appendices epiploica. On section there is found a circumscribed mass 3 cm. in diameter projecting into and partially obstructing the lumen of the bowel. This mass is covered by the mucous membrane of the bowel and is not ulcerated. Cross section reveals, from within outward, the mucous membrane, a narrow zone of white tissue, then a grey granular mass involving the muscularis. No enlarged lymph nodes are found." The microscopic picture was that of endometriosis.

During the 19 months period covered by this survey, beginning January, 1946, Jack G. Kerr and I resected a total of 23 carcinomas of the left colon, 11 of which were in males. I find that we resected exactly twice this number of cancers of the rectum during the same interval. It was interesting to note that even in this small series the tendency of colonic cancer to be more favorable in prognosis was present (Table). Eighty-two curred in 11 of the 46 rectal cancers (23 per cent). While nodal involvement or even liver metastasis was not considered a legitimate bar to removal of the primary tumor, two cancers of the sigmoid, in one of which a second neoplasm was present in the rectum, were encountered in which it was mechanically impossible to resect the growth; a simple colostomy was done in each.

For various reasons, including partially unrelieved obstruction and infection, seven of the tumors were removed in multiple stages. The remaining 16 cancers were resected with immediate anastomosis without complementary enterostomy. The now accepted preoperative routine was initiated well in advance of celiotomy, including appropriate dosage of sulfasuxidine or sulfathalidine, which were frequently given before the patient entered the hospital. When urinary infection was present, I confirmed Poth's observation[3] concerning the effectiveness of these drugs in controlling gram-negative organisms in the urinary tract without the peril of crystaluria, since it is excreted in the urine as a water soluble salt.

There were no surgical fatalities and no instances of peritonitis in any of these resections. There were, however, several individual instances of various postoperative complications.

An elderly man whose growth had been resected and the bowel joined five days before, had partial separation of a wound in which the fascia had been sutured with steel alloy wire. The defect was discovered and successfully corrected within the hour. A ventral hernia developed in a woman whose temporary colostomy had been closed several months before—a not infrequent sequela of the two-stage operation.

"Aseptic" anastomosis was attempted in only one of these patients, although I have used the Rankin Clamp often in the past. In this case patency of the lumen was demonstrated after the operation by passage of gas; later a complete diaphragm was formed by adhesion of the crushed edges and reanastomosis was required. Before sulfasuxidine and sulfathalidine were available, there was a definite indication for this closed operation over clamps, but, as Meyer has said,[4] by a carefully planned regime, including the use of these drugs, it is now possible and preferable to resect the colon if unobstructed, to perform a primary "open" anastomosis, to return the colon to the peritoneal cavity without performing a proximal colostomy and to close the wound without drainage. An additional safeguard against diaphragm formation, we believe, is severance of the bowel with the scalpel instead of the cautery.

There are still indications, however, for "stage" resections of colonic tumors, and it is perhaps just as well that these should be constantly re-emphasized to counteract a natural desire on the part of all of us to spare the patient multiple procedures. An analysis of 100 cases of cancer of the colon from the records of Baylor Hospital in Dallas[5] demonstrated that 60 per cent presented evidence of obstruction—constipation, colic, distension or overflow diarrhea. Patterson and Webb[6] reported that nearly one half of patients with colonic tumors in the Roosevelt Hospital showed some obstruction, and, more recently, Michel[7] found that more than one fourth of a series of 203 cases of malignancy of the large bowel seen at Charity and Tuoro Hospitals in New Orleans were acutely obstructed, the mortality rate in this group of 55 patients being 33 per cent.

Even when obstructive symptoms are apparently controlled by preoperative mechanical measures or when local inflammation from perforation of the growth seems quiescent, there are borderline situations where discretion should still be the better part of valor:

An elderly white man entered the hospital with a long history of bleeding, colic, constipation and recent profound anemia. The roentgenogram demonstrated a very large tumor of the splenic flexure. Two weeks were required to decompress the bowel and restore depleted blood volume. When the abdomen was opened, extensive adhesions to all nearby viscera were present. The tumor was resected with considerable difficulty and the transverse and descending colon were united end-to-end. Several days later a subdiaphragmatic abscess was detected and drained by removal of a portion of a rib and later still, a fecal fistula through this wound indicated leakage from the suture line. A transverse colostomy was done before peritonitis occurred and, fortunately, the defect in the anastomosis healed promptly, making it possible to close the temporary colostomy.

Not infrequently a patient with a colon anastomosis will complain of mild flatulence and constipation due to narrowing of the new lumen. Knowing as we do that the most effective preventative or correction of anal stenosis following operative procedure on the anal canal is the daily passage of bulky formed stools, I have reasoned by analogy that the same mechanics should be useful here if not too long delayed and have found this to be true.

Detection and removal of colonic polyps offers even more satisfaction than excision of frank cancers. During this recent nineteen months period we explored the left colon of five individuals, ranging in age from 3–55, because of the possibility of the presence of a solitary polyp. We believe that exploration is entirely justified if suggestive symptoms are present, even if repeated roentgen examinations fail to offer positive findings. This was true in two of these cases; in one of them no lesion could be found when the abdomen was explored, but in the other, a white woman of 30, who had been treated for "colitis" because of recurrent cramping and whose hemorrhoids had been excised, ineffectually, because of recurrent passage of streaks of blood, a small pedicled papillary adenocarcinoma of the descending colon was discovered and removed.

The surgeon must accept unusual responsibility in connection with the management of intestinal polyps. Here he cannot delegate to the pathologist, through biopsy, the decision as to what operative procedure is to be used. We believe that resection of a portion of the bowel is indicated when the stalk of the polyp is altered from normal or when the mucosal base is puckered, never because of the sole fact that the polyp itself contains malignant tissue.

A Jewish woman, 56, complained of passage of fresh or clotted blood from the bowel at intervals for two years, during which time proctoscopic examinations by two physicians and x-ray of the colon had been reported negative. Through the sigmoidoscope the fundus of a papillary mass was seen 9½ in. from the anal verge. Biopsy from

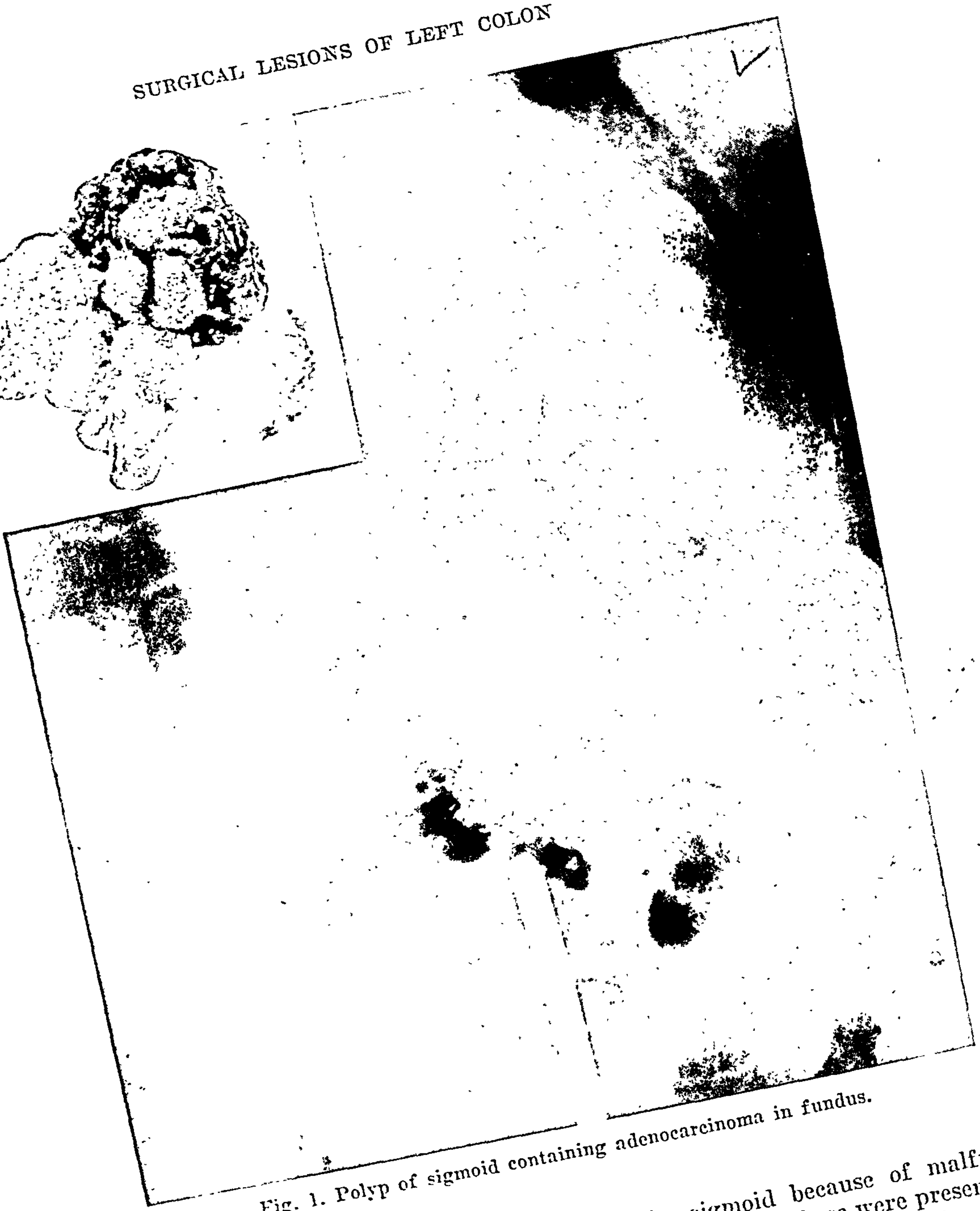

Fig. 1. Polyp of sigmoid containing adenocarcinoma in fundus.

of the sigmoid because of malfunction and stenosis. All of these were present in patients in whom we had previously resected the rectum. Two were the direct result of incidents connected with the original procedure, the first resulting from partial necrosis of a colostomy whose blood supply was injured when the bowel was brought out through a lateral "stab" opening. The second was a woman who had continued, after an abdominoperineal resection six months previously, to be obstipated and to have severe cramping pain

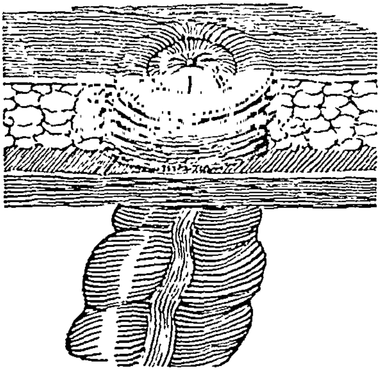

Fig. 2. Typical findings in stenosis of colostomy.

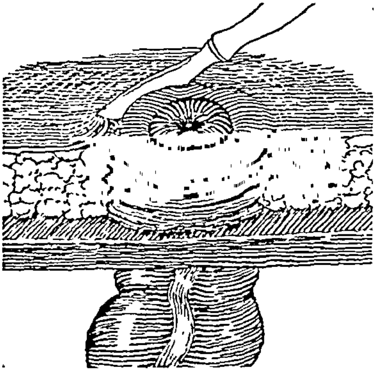

Fig. 3. First step in freeing stenosed colostomy.

when the bowel was irrigated through an apparently normal stoma. An area of partial obstruction was found several inches proximal to the outlet, due to adhesion of a loop of small bowel. When this was freed, all symptoms were relieved.

The findings in the remaining cases were strikingly similar to each other; the malfunction had developed at widely varying intervals following the original construction of the colostomy—seven months in one instance and ranging to more than four and one half years in four patients. The part of the colon left above the skin level was observed to have been drawn into the area between the skin and fascia (not into the abdomen), and a constricted annular keloid was present at the skin outlet. This deformity is not, apparently, the result of increase in the adipose layer, as the formerly exposed bowel is found intact in length, compressed under the skin and not on tension (Fig. 2).

I am now convinced that this undesirable and annoying complication is due to a mild chronic inflammatory reaction in the serosa of the exposed bowel and, particularly, in the appendices epiploica left on the bowel, which slowly pulls the colon under the skin level and, by involvement of the raw skin edge, excites a fibroplastic process in this margin also. Leaving a long exposed segment is not an entirely effective remedy, because the inflammatory process can eventually act on any amount of bowel. Careful removal of all attached epiploic tags and mesentery and inversion of the skin edge will, I believe, do much to prevent the occurrence of this type of stenosis.

We are indebted to Cattell[8] for demonstrating a useful method of correcting this deformity. After the bowel has been freed from its subcutaneous attachments and the annular scar excised (Fig. 3), the nearby skin is freed of fat and sutured to the corresponding fascia. Because it is at times difficult to roll the skin under completely, I have recently used the Sturmdorf stitch (Fig. 4) with a silkworm suture to hold the skin more firmly and effectively in place.

SUMMARY

The diagnostic problems encountered in connection with lesions of the left colon are numerous, the distinction between malign tumors and the tumefaction produced by diverticulitis being the most difficult.

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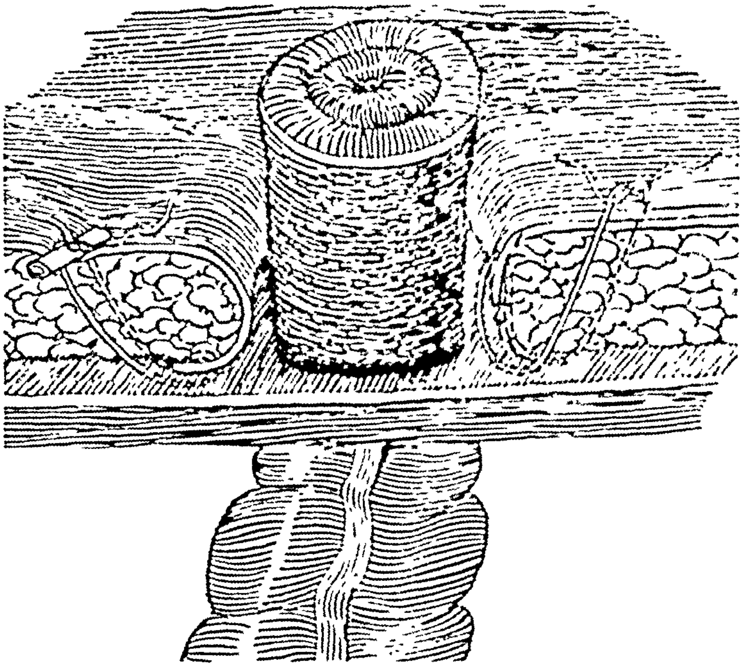

Fig. 4. Application of the Sturmdorf suture to Cattell method of skin inversion.

bidity in this surgical field. A recent series of 23 consecutive resections of malignant tumors of the left colon, without fatality, peritonitis or serious wound infection, is reported.

Definite indications for multiple stage resection of colonic tumors still exist, including partial obstruction and infection.

Exploratory operations for possible colonic polyposis are justified in the presence of inconclusive radiologic findings because of the serious potentialities of the lesion. The surgeon, not the pathologist, must determine how extensive the surgical procedure shall be when a polyp is discovered in the colon.

A high incidence of stenosis of end colostomies has been observed recently in our work, apparently due to a low grade inflammatory reaction causing retraction. A technic for the prevention and repair of this type of stenosis is described.

SOMMAIRE

Les problèmes diagnostiquesqu'on rencontre dans les lésions du côlon gauche sont nombreux. Il est surtout difficile de faire la distinction entre les tumeurs malignes et les tuméfactions produites par les peridiverticulites.

Les méthodes actuelles dans la préparation des malades pour la chirurgie du colon, surtout l'administration de la sulfasuxidine, et du sulfathiazole ont beaucoup diminué la mortalité et la morbidité dans ce champ opératoire. L'auteur rapporte vingt-cinq cas consécutifs de résection de tumeurs malignes du côlon gauche sans fatalité, sans péritonite, sans infection sérieuse de plaie opératoire. Des indications précises pour la résection des tumeurs coloniques, en plusieurs temps, même dans les cas d'obstruction partielle et d'infection ne doivent pas être ignorées.

Les opérations exploratrices pour polyposes coloniques sont justifiées vu les sérieuses potentialité de ces lésions, quand les rapports radiologiques sont inconclusifs. Le chirurgien, et non le pathologiste, doit décider de l'étendue de l'opération en presence de polype du côlon. Une haute incidence de stenoses de colostomies terminale a été observé dans nos cas récemment. Cette stenose apparemment est due à une réaction inflammatoire causant une contraction. Une technique pour la prévention et le traitement de cette sténose est décrite.

RESUMEN

Las lesiones del colon presentan numerosos problemas de diagnostico, siendo el mas dificil,

el diagnostico diferencial de los tumores malignos de la tumefaccion que produce la peridiverticulitis. La mortalidad y morbilidad en la cirujia del colon ha disminuido considerablemente gracias a la terapeutica preoperatoria y muy en especial a la administracion de la sulfasuxidina y sulfatalidina. En una serie reciente de 23 casos de resecciones de tumores malignos de colon izquierdo, que reporta el autor, no hubo mortalidad, ni peritonitis, ni infecciones serias de la incision.

La exploracion quirurjica es justificada en aquellos casos en que se sospeche la poliposis del colon cuando el diagnostico radiologico es inconclusivo. Es la responsabilidad del cirujano y no del patologo el determinar la magnitud de la reseccion del colon en casos positivos de poliposis.

El autor ha observado una incidencia elevada de la estenosis en las colostomias terminales en su clinica, y segun el, esto se debe aparentemente a reacciones inflamatorias benignas. El autor presenta su tecnica en la prevencion y tratamiento de estes estenosis.

SOMMARIO

Numerosi e complicati sono i problemi riguardanti la diagnosi differenziale delle lesioni del colon discendente: la piu' difficile e' quella fra peridiverticolite e tumori maligni. Gli attuali metodi di preparazione degli ammalati e piu' specialmente la somministrazione preoperativa di sulfasuccidina e di sulfatalidina hanno progressivamente diminuito la mortalita' e la morbilita' in questo campo operativo. In un recente gruppo di 23 resezioni per tumori maligni del colon discendente non vi e' stato alcun caso letale e non e' occorsa alcuna peritonite od infezione grave della ferita.

Esistono tuttora definite indicazioni per resezioni a tappe dei tumari colici, compresa un'ostruzione parziale od infezione. Interventi esploratori—in presenza di reperti radiologici indefiniti—per una possibile poliposi del colon trovano una giustificazione nella subdola evoluzione di questi tumori. Quando un polipo e'scoperto nel colon, il chirurgo—e non il patologo—deve stabilire l'estensione dell' intervento operativo. L'A. ha notato un'alta incidenza di stenosi nelle colostomie terminali, dovute probabilmente ad una lieve reazione infiammatoria e conseguente retrazione. Nell'articolo viene illustrata una tecnica speciale per la prevenzione e per la riparazione di questo tipo di stenosi.

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Carcinoma and Uterine Fibromyomas*

FREDERICK H. FALLS, M.S., M.D., F.A.C.S.
CHICAGO, ILLINOIS

FIBROIDS of the uterus are classified as benign tumors which, when successfully removed surgically, free the surgeon from further responsibility in a given case. By and large this confidence in the benign nature of these neoplasms is justified in most cases, and therein lies the great danger of falling into serious diagnostic error.

In the first place, the incidence of sarcomatous degeneration of the fibroids is usually put at about 2 per cent, and some authorities claim it to be even higher in carefully studied series. It is not easy to differentiate microscopically between a rapidly growing cellular fibroid and a slow growing sarcoma. It is interesting to note that Oscar Fraenkel reported 2 per cent malignancy in a 10 year period in his clinic in Vienna, and that, in a later review of the same material, he classified 10 per cent of the tumors as malignant after examining the same slides in the light of his increased experience. The difficulty of differentiating between benign and malignant lesions clinically is easily appreciated.

Most men who have studied malignancy extensively agree that two factors seem to enter into the determination of malignant growth.

1. There must be an abnormal stimulus to cell reproduction by a hormone or an irritant.
2. There must be a biologic defect in the host resulting in the absence of an X substance which normally controls cell reproduction in response to irritation. This permits the unlimited reproduction of cells, which is called malignancy.

If we accept this viewpoint it would seem logical to assume that most patients with fibroids have sufficient stimulant at the site of the fibroids to produce the overgrowth of the connective tissue and muscle cells and sufficient of the X substance to bring such cell reproduction to a stop before the growth becomes wild and unlimited. We assume this to be true in about 98 per cent of cases. However, we must admit if we are to be logical, that the X substance which prohibits the change from a fibroid to a fibrosarcoma probably is much the same as that which prevents a chronically infected cervix from going over to a carcinomatous cervix or a chronic hypertrophic endometritis from developing into an adenomalignum or an adenocarcinoma.

If these premises are correct then it follows that we as clinicians, knowing the danger lurking in the fibroid uterus, will cease thinking of these tumors as strictly benign and go over to the opposite viewpoint, namely, of suspecting all of these tumors of harboring malignant cells, either in the fibroids themselves or among the epithelial cells of the endometrium or cervix.

The question might well be asked, if malignancy is so common in connection with fibroids, why is it that more has not been said about it in the literature? The reason, I believe, is obvious if one considers the reaction of medical personnel to the subjects of fibroids and carcinoma. For example, a woman is admitted to our service at the Cook County Hospital as a case of fibroid uterus. The enlargement of the uterus is obvious, other symptoms correspond to the classical picture of fibroids and an operation is performed. On opening the uterus, the pathologist finds multiple fibromyomas and in addition a carcinoma of the fundus of the uterus. The report is returned adenocarcinoma of the body of the uterus. The patient is immediately put on x-ray and radium management and becomes statistically a carcinoma of the body of the uterus. The fact that she had mutliple fibromas of the uterus is entirely forgotten.

Another patient enters the hospital because of bleeding profusely at the menstrual periods. She has a fibromyoma of the uterus, which obviously could explain the bleeding. Fibromyoma of the uterus is diagnosed, and unfortunately operation is often undertaken without further consideration of the case. Speculum examination would have revealed a rather well advanced carcinoma of the cervix, which was accountable for most if not all of the excess bleeding. Occasionally, however, the tumor may be located in the upper portion of the cervix where its detection is more difficult on casual inspection. If on inspection or other diagnostic procedure a carcinoma is found, that patient is catalogued as a carcinoma of the cervix and treated as such, and the fact that she also has fibromyomas receives scant attention, if any.

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A patient is operated upon for myomas of the uterus, and a supracervical hysterectomy is done. Six months or a year later she returns to the clinic with a lesion on the cervix, which on microscopic section reveals a squamous cell carcinoma. The diagnosis then is carcinoma of the cervical stump, but no mention is made of the fact that the uterus belonging to that cervical stump contained fibromyomas before the carcinoma developed in the stump. Furthermore, evidence is beginning to accumulate that in such cases the probability is very great that the carcinoma was present and overlooked by the surgeon at the time of hysterectomy.

DIAGNOSIS

How, then, are we going to differentiate cases that can be classified as simple fibroids of the uterus from those which may be harboring an unsuspected carcinoma or sarcoma? We may as well start off by saying frankly that in some cases the differentiation cannot be made clinically. However, these are very rare since in most cases the differential diagnosis is not too difficult to make, if the surgeon is sufficiently familiar with these tumors and if sufficient effort is put forward to apply the standard diagnostic procedures.

The fibroid uteri which develop carcinoma as a complication may be divided as follows:

I. Carcinoma of cervix; a., squamous; b., adenocarcinoma.
II. Carcinoma of the body of the uterus.
III. Carcinomas associated with uterine polyps.
IV. Carcinomas occurring in the cervical stump after hysterectomy.

Differences in symptoms and physical findings mark the various types of complicating carcinomas in fibroid uteri. These differences necessitate different diagnostic procedures for the determination of the presence or absence of carcinoma.

Carcinoma of the cervix may appear as a Group I of the Schmitz classification, a nodule without ulceration or other attributes that would indicate that malignancy was present. These tumors often grow slowly at first, but if untreated by radiation or cautery progress rapidly. The Schiller stain is usually positive and they are easily visualized by vaginal speculum. Biopsy can be easily obtained and should never be postponed or neglected. These patients are without symptoms as far as the carcinoma is concerned, and what symptoms are present are due directly to the fibroids and not to the carcinoma. Such symptoms are menorrhagia, pressure on bladder or bowel and abdominal tumor, frequently nodular and much larger than a uterus affected only by carcinomatous degeneration. The vaginal smear may or may not be positive for carcinoma, but the cervical biopsy will show the malignant change. If the lesion is of the Group II, III or IV (Schmitz), the symptoms presented are not those seen in the average fibroid uterus. Metrorrhagia replaces menorrhagia and a foul leukorrhea develops, which is strongly suggestive of malignancy, although a similar discharge may be present in a submucous degenerating fibroid. Speculum examination reveals necrosis of the cervix with friable carcinomatous tissue, and digital examination reveals a cauliflower mass or crater, depending on the stage of development of the tumor.

When the tumor arises from the endocervix or endometrium, in the early stages a watery discharge between periods, associated with menorrhagia, is significant of associated carcinoma. When this is followed by metrorrhagia, first seen as a spotting and later followed by frank hemorrhage, the suspicion of carcinoma is at once aroused. In such cases vaginal examination and inspection is of little value; the Schiller test is worthless. The Papanicolaou stained smear from the cervix is valuable if positive. The Clark test can well be applied here. It consists of irritating the endocervix and endometrium by use of an intra-uterine probe, which produces bleeding of significant amount. An endometrial biopsy, first of the endocervix, then of the endometrium, may be taken with a Novak or other simple curet and the removed tissue sent to the laboratory as separate specimens and examined histologically after preparation of paraffin or frozen sections. There is some value from a prognostic and therapeutic standpoint in determining whether or not an adenocarcinoma of the uterus is located in the body of the uterus or in the endocervix. Finally, a thorough curettage of the endometrial cavity can be done under twilight sleep and local or under general anesthesia. This gives samples from the whole endometrium for diagnostic study. It must be remembered that diagnostic curettage may not always reveal a carcinoma. The tumor may be located above a submucous fibroid, which prevents access to that part of the uterine cavity by the curet. In such cases, especially, it should be the rule to open the uterus at operation so that thorough inspection of the whole endometrium may be made before deciding on the extent of tissue to be removed.

TREATMENT

Treatment of fibroids complicated by carcinoma depends on several factors or combinations of factors. If the carcinoma is very early and either of the cervical or endometrial type, a total panhysterectomy should be done, followed by adequate doses of x-ray and radium. If the carcinoma is of Group II, III or IV (Schmitz), and the fibroid is larger than a three month pregnancy, the situation is much more complex. X-ray and radium should be used first on the lesion, followed by operation or more radiation, depending on the reaction to the first treatment. If the lesion is of Group II (Schmitz) when first seen, then an operation may be undertaken if there is no infiltrtaion or evidence of activity after two or three months. If the fibroid is smaller than a three month pregnancy, the carcinoma may be treated as if it were in a nonfibroid uterus.

When a fibroid uterus is removed for carcinoma, it is mandatory to remove the cervix, tubes and ovaries as well as the body of the uterus. The reason for this is the high frequency of ovarian and cervical stump carcinoma, when a supracervical hysterectomy is done in these cases.

In all cases a careful follow-up with x-ray and radium to the vault of the vagina, held in place with a wax mold, is probably the best method of treatment; 1,500-2,000 mgm. hr. of radium may be administered in divided doses and supplemented by 10,000 r of x-ray through six portals and in addition some additional dosage may be given through a vaginal cone.

It is of considerable importance to recognize the fact that malignant polyps of the uterus are always associated with infection. These, therefore, should always be removed from below, the base cauterized and a few weeks allowed to elapse before surgical removal of the body of the uterus. The reason for this is that they are usually infected with Streptococcus hemolyticus or other virulent organisms, so that removal through an abdominal incision before removing the polyp or before the infection has had a chance to clear up after vaginal removal of the polyp is extremely dangerous. Even when using the technic here described, we use prophylactic injections of penicillin or sulfadiazine, whichever in a given case seems most indicated.

DISCUSSION

It is extremely difficult to obtain accurate figures on the incidence of malignancy in fibroid uteri in most clinics for the reasons pointed out. To throw some light on the frequency of carcinoma occurring in connection with fibroids, we took 421 cases of carcinoma of the uterus which occurred in our clinic in the past 20 years. Of this number, 44 occurred in uteri with fibromyomas. Therefore, approximately 14 per cent of our malignancies of the uterus had fibroids. This list included 2 cases of carcinoma of the cervical stump in women who had originally been operated on for removal of a fibroid uterus supravaginally.

A somewhat smaller, but equally carefully compiled case series was studied at the University of Iowa from 1921 to 1926. These cases included fibroids with carcinoma, sarcoma and those admitted for treatment of carcinoma of the stump previously operated upon for fibroids of the uterus. In this group, malignancy was found in 13.5 per cent of 128 cases. It is possible that an even larger number of cases of cervical stump carcinomas developed in patients who had had supracervical hysterectomy for fibroids in our clinic and went elsewhere for treatment when and if carcinoma developed. This suggests another point which seems to need stressing.

It is becoming increasingly evident that carcinoma can be present in the cervix of the uterus with very slight growth changes over a period of years, so that the problem of diagnosis of carcinoma in the cervical stump at the time of operation for fibroids is not so simple. Repeated postoperative examinations at regular six month intervals would solve the problem in most cases, but it is often difficult to get the patients to cooperate. One alternative is the removal of the cervix with the uterus in all cases. This may be done in most cases without too great increase in operative mortality. I believe, however, that if attempted by general surgeons on all cases, the mortality and morbidity would be considerably higher than supracervical hysterectomy. This is because it is necessary to enter the vagina, which is an infected cavity and because it is necessary to strip the bladder down off the vaginal wall, increasing the danger of injury to this organ; finally, it is necessary to cut and tie the cervical branches of the uterine arteries as well as the main uterine arteries, which somewhat increases the danger of postoperative hemorrhage.

An alternative procedure which we endorse is that of cauterizing the cervix thoroughly immediately preceding supracervical hysterectomy. This has the added advantage of having, during operation, the cervix with its attachment to the cardinal ligaments, to which can be sewed the round and broad ligament stumps. This procedure lessens the danger of prolapse of the vaginal vault postoperatively, a lesion which is becoming more and more common as more total abdominal and more total vaginal hysterectomies are being done.

CONCLUSIONS

1. Malignant changes in fibroid uteri are not rare.

2. The symptoms produced by fibroids may so completely simulate those produced by the associated carcinoma, that the greatest circumspection is necessary to avoid overlooking the latter.

3. To be safe, all cases of fibroids should be suspected of harboring malignancy until proven to be benign, especially those occurring in women in the fifth decade.

4. The best procedures to help determine the diagnosis are the Schiller test, the Clark test, the Papanicolaou smear, cervical biopsy, endocervical and endometrial biopsy and diagnostic curettage.

5. When removing a fibroid uterus, the seat of a malignancy, a total panhysterectomy should be done in all cases except where the tumor has spread beyond the confines of the uterus.

6. Radium and x-ray preoperatively and postoperatively are useful adjuncts in management of these cases. In small fibroid uteri with advanced carcinoma they are the sole treatment, replacing operation.

7. Early recognition and prompt removal of these malignant tumors will reduce the mortality from carcinoma of the uterus significantly.

8. Care should be taken, when operating in absence of complete pathologic reports or knowledge of the histopathology of the endometrium, to scrutinize the endocervical and uterine canal at the operating table.

RÉSUMÉ

1. Les changements malins dans les fibromes utérins *ne sont pas rares.*

2. Les symptômes produits par les fibromes associeés à un carcinome simulent parfois si complètement les symptômes déterminés par les carcinomes qu'il est nécessaire d'agir avec grande circonspection.

3. Pour être prudent, on doit soupsconner que tout fibrome renfermé des possibilités malignes *surtout ceux qui surviennent* dans la cinquième décade de la vie.

4. Les meilleurs procédés pour determiner le diagnostique sont l'épreuve de Schiller, l'épreuve de Clark, le frottis de Papanicolaou, la biopsie cervicale, la biopsie endométriale et le curettage diagnostique.

5. En enlevant un utérus fibromateux, le siège d'une tumeur maligne, il est indiqué de faire une panhystérectomie totale excepte dans les cas où la tumeur ne s'étend pas au delà de l'utérus.

6. La radium et les rayons X avant et après l'opération sont de précieux adjuvants. Dans les petits fibromes avec un carcinome étendu c'est le seul traitement remplaçant le traitement opératoire.

7. Le diagnostique précoce et l'ablation prompte de ces tumeurs malignes réduiront sensiblement la mortalité due aux carcinomes utérins.

8. En opérant dans ces cas, il importe de faire un examen minutieux du canal utérin et endocervical durant le cours de l'opération. Cela esta nécessaire seulement dans l'absence d'un rapport préopératoire sur l'histopathologie de l'endométrium.

SOMMARIO

1. Degenerazioni maligne nei fibromi dell' utero non sono rare.

2. I sintomi provocati dai fibromi possono simulare in modo cosi perfetto quelli dei carcinomi, da rendere necessaria la massima oculatezza nella diagnosi differenziale coi tumori maligni.

3. Ogni fibroma dovrebbe essere ritenuto sospetto di albergare un tumore maligno, specialmente quando si tratti di donne oltre i 50 anni.

4. I metodi diagnostici piu' sicuri sono rappresentati dal metodo di Schiller, di Clark; dagli strisci secondo la tecnica di Papanicolaou; dalla biopsia cervicale e dal raschiamento diagnostico.

5. In ogni caso di fibroma associato ad un carcinoma si deve procedere ad un'isterectomia totale, a meno che il tumore maligno abbia gia' varcato i confini dell'utero.

6. La radioterapia pre- e postoperatoria trova in questi casi un'utile indicazione. Nei piccoli fibromi associati a carcinomi gia' molto progrediti la radioterapia sastituisce l'operazione.

7. Nei casi in cui manchi un accurato reperto istopotologico preliminare si deve ispezionare con la massima cura—durante l'operazione—le condizioni della cavita' uterina e del canale cervicale.

RESUMEN

1. Los cambios malignos en los fibromas uterinos no son raros.

2. Los fibromas uterinos peuden producir una sintomatologia que puede simular completamente los producidos por el carcinamo asociado y enmascararlo por lo tanto es muy importante el guardar gran cuidado para evitar el error en el diagnostico.

3. En todos los casos de fibroma uterino se debe siempre de sospechar el carcinoma especialmente en mujeres que ya han llegado a la quinta decada de la vida.

4. De todos los procedimientos en el diagnostico diferencial del cancer uterino al comando del cirujano los mejores son: el de Schiller, Clark, Papanicolaou, la biopsia del cuello uterino y de la mucosa endocervical y endometrial y por ultimo el curetaje.

5. En el tratamiento quirurjico del fibroma uterino con cambios cancerosos se debe de practicar la pan-histerectomia total con excepcion de aquellos casos en que el cancer ya sobrepaso los confines del utero.

6. El radium y los rayos X son de valor como medidas adjuntas en el tratamiento pre y post-operatorio; y constituyen el unico tratamiento en aquellos casos de pequenos fibromas complicados por un cancer ya avanzado.

7.La mortalidad del cancer uterino disminuira en relacion directa con el reconocimiento temprano de estas lesiones y su tratamiento inmediato.

8. El cirujano debe siempre de hacer un examen minucioso del canal uterino y cervical durante la operacion en todos los casos en que no ha sido posible obtener un examen histopatologico completo del endometrio o de la mucosa endocervical.

The Surgical Aspects of Endometriosis*

VIRGIL S. COUNSELLER, M.D., F.A.C.S.**
ROCHESTER, MINNESOTA

THE term "endometriosis," familiar to medical men, was introduced by Sampson[1, 2] to describe peculiar lesions which occur in adult women and which are found almost exclusively in the pelvis or the lower part of the abdomen. Regardless of their particular location, these lesions have as their common denominator the presence of endometrial tissue which is indistinguishable pathologically and physiologically from that found within the uterine cavity. They are neither tumors in the ordinary sense of the word nor products of inflammation, although they have some of the characteristics of both orders of pathologic phenomena.

Therefore, by the term "endometriosis" is meant the occurrence of endometrial tissue outside the uterine cavity. This ectopic endometrium may take the form of invasive nodules in the uterine wall with the formation of the familiar adenomyomas first described by Cullen.[3] This form is known as "internal endometriosis." For the condition in which the ectopic tissue is located elsewhere the terms "external endometriosis," "endometrial adenosis" or just plain "endometriosis" are used almost interchangeably. It is chiefly this latter condition which commands our attention today.

Endometriosis appears to be associated frequently with primary or secondary sterility and in a large proportion of cases there is associated disease of the uterus or adnexa; it is also interesting to note that in many patients in whom this condition is found, an abdominal or a pelvic operation has previously been performed. Thus in a recent study at the Mayo Clinic an incidence of pregnancy of only 56.5 per cent was found; previous surgical procedures had been carried out in 54.2 per cent of patients, and associated disease of the uterus or ovaries or both was found in more than 50 per cent.

Aberrant endometrium may appear within the uterus, in the pelvic tissues or organs, or finally in locations distant from the uterus. In the uterus, the endometrial tissue may be within the muscle, under the peritoneum or in the region of the cervix. External locations may be a fallopian tube, an ovary, the rectovaginal septum, the uterine and ovarian ligaments or the pelvic glands; more rarely the large or small intestine, the appendix, the inguinal region, the labia, the umbilicus, laparotomy scars or the lungs may be involved. In all of these various locations, the pathologic findings are the same; there are glandular tubules identical with the epithelial diverticula of the uterine mucosa, formed of simple columnar epithelium, which is often ciliated. Around these epithelial formations one finds a connective tissue containing nuclei which resemble those in the subendometrial tissue of the uterus; there may also be smooth muscle fibers between the epithelial islands, the whole recalling a miniature uterus. In addition to this morphologic resemblance, the endometrial formation, under the influence of the ovarian hormones, follows the menstrual cycle of the uterus; hemorrhage occurs, cysts form and rupture may ensue. It is therefore this periodic bleeding process which accounts for the clinical symptoms and pathologic findings of the disease.

The number and the diversity of the hypotheses which purport to explain the pathogenesis of these phenomena are ample evidence of the uncertainty which still enshrouds the origin of endometriosis. It must, however, be borne in mind that in this condition several distinct pathogenic factors may operate, just as in carcinoma generalization may occur by virtue of lymphatic, vascular and contiguous dissemination. In a general way these various hypotheses have been grouped into the three following classes: (1) embryonic, (2) metaplastic and (3) migratory. No useful purpose can be served by a discussion of these hypotheses in this communication, since they are well defined in the literature on this subject.[4]

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** Division of Surgery, Mayo Clinic.

PATHOLOGY

The basis of surgical treatment of any surgical lesion is an accurate knowledge of the pathologic process involved. Therefore, it is pertinent to discuss this phase in some detail. My colleague Dockerty[5] has clearly described this process when he stated "that the pathologic fundamental constantly to bear in mind is that each area of endometriosis is in itself a small uterus with functioning glands and stroma." Like ordinary endometrium this ectopic tissue is acted on by the ovarian hormones and, as stated previously, proliferates, differentiates and menstruates in a cyclic fashion. With the accumulation of menstrual blood small cysts are formed. These gradually distend as a result of repeated monthly hemorrhages. Hemoglobin is released and causes irritation with fibroblastic reaction, involvement of nerves and referred pain. Eventually, when the pressure of retained contents reaches a certain point, the cysts rupture with a spillage of irritating contents over adjacent portions of the peritoneum and local peritonitis results. Loops of bowel become adherent in the pelvis through fibrous bands. These are not easily separated like inflammatory adhesions because they are incorporated with endometrial implants spilled at the time of rupture. Growth of these glands with further hemorrhage and more fibrosis may result in large endometriomas in the rectovaginal septum, sigmoid, small intestine and so forth. Adjacent loops of bowel so involved offer no clear-cut lines of cleavage, and attempts at separation may lead to peritonitis, formation of fistula, etc.

In the ovary these cysts tend to be large, the so-called tarry cysts, which are often bilateral and which often destroy the major portions of both ovaries. Functional destruction in these cases parallels anatomic destruction, the endometrium in the uterus becomes cystic, menstrual irregularities occur and sterility often results. When extensive gradual ovarian destruction takes place, it may be said that such patients are undergoing a slow menopause, and for this very reason the removal of the pelvic organs does not produce such a profound physiologic change as it does when performed for other types of lesions in which ovarian destruction has not been a prominent feature.

The lesions on the uterus are usually small and situated for the most part on the posterior wall. The severe dysmenorrhea in these cases is explained by congestion and hemorrhage irritating the musculature of the uterus in the vicinity of the lesions. Presacral neurectomy will relieve this type of pain but will have no effect on the "parietal" type produced by nodules of endometriosis located on the parietal peritoneum.

The lesions may occlude the isthmus of the tubes or close the fimbriated ends, thus rendering the patient sterile. Also, the mucosa of the fallopian tubes is often thrown into folds by endometrial implants, thus impeding the progress of the fertilized ovum. This situation accounts for about 15 per cent of ectopic gestations.

Endometriosis occasionally involves the urinary bladder and in this location it may represent almost a solitary lesion. Dysuria and hematuria from involvement of the serosa and mucosa of the bladder may occur. Similarly, symptoms referable to the rectum and sigmoid are obtained on a comparable basis. Intestinal obstruction may result and resection may become necessary.

One should ask, What is the pathologic fate of these endometrial implants? At the menopause, of course, like ordinary endometrium they cease to function. A similar result is obtained when the ovaries are removed. Hormonal stimulation no longer occurs and glandular atrophy results. But before the menopause the life cycle of an endometrial implant may become spontaneously arrested by one of two methods; namely, (1) complete shedding of the lining during menstrual bleeding, (2) pressure atrophy from increasing tension within an endometrial cyst. If this occurs, the activity of the endometrial cyst is at an end. This explains why one often finds large endometrial cysts in the ovary with many surrounding adhesions and yet the patient has few or no symptoms.

SYMPTOMS

The typical patient with endometriosis has pelvic pain, as premenstrual engorgement proceeds in the five days before menstruation. With menstruation the ectopic endometrium is also most active and the increased discomfort is usually interpreted as dysmenorrhea. This discomfort is not relieved with the establishment of flow, but tends to continue severe throughout the menstrual period. Pelvic comfort is gradually reestablished over the next three to five days, and the patient enjoys relative comfort until the cycle repeats itself.

Certain accidents may occur in the course of pelvic endometriosis to precipitate an acute pelvic episode. Chief among these is the rupture of a large tarry cyst, usually at a menstrual period. The signs and symptoms are similar in every respect to those of acute or subacute pelvic peritonitis. These cysts, though infrequently, may become twisted or infarcted to precipitate an acute episode. In a few cases the intestinal wall has become so involved as to cause subacute obstruction.

The pelvic pain has certain characteristics. It is not relieved by antispasmodics, as is true dysmenorrhea. Most pelvic pains are relieved by application of heat to the abdomen but, since this causes increased engorgement, the pain from endometriosis is made worse by heat. Any activity which tends to irritate these regions further or increase their engorgement increases the discomfort. Very characteristically, many patients will volunteer the information that their discomfort is made worse by riding in a train or a car, intercourse or pelvic examination or after long hours on their feet.

Menorrhagia and metrorrhagia are symptoms complained of by almost 50 per cent of the patients. In the majority these symptoms can be explained on the basis of uterine fibroids which complicate 50 per cent of cases of endometriosis. In some, however, there is no doubt that cystic endometrial hyperplasia, produced as a result of destruction of ovarian tissue, accounts for the irregular bleeding.

On physical examination the most diagnostic findings are the puckered, shotty, indurated nodules in Douglas' cul-de-sac and over the posterior surface of the uterus. These are best felt either rectally or by rectovaginal examination. Early in the course of the disease, there are diminished mobility of the uterus and shortening and increased sensitivity of the uterosacral ligaments. Often the most striking thing is pain on examination out of all proportion to the physical findings, for these regions may be too soft to palpate. Endometrial cysts of the ovary differ from other ovarian cysts in that their contour is rough and irregular and they are bound down to the adnexa or to Douglas' cul-de-sac.

SURGICAL FEATURES

I believe that there is no pelvic operative procedure that at some time is not required for endometriosis or made more difficult by its presence. Few conditions demand more surgical skill and judgment to secure the best way out of an unfortunate situation for the patient.

Since the symptoms of endometriosis per se are due to the presence of functioning ectopic endometrium, castration could reasonably be expected to cure the patients. This is no doubt true of the majority of cases, the exception to this being those cases in which the chief symptoms are due to a mass in the pelvis, obstructed loops of bowel or massive adhesions.

If one belongs to those surgeons who feel that the ovary serves no useful function after the age of 40 years—my colleagues and I do not—then the treatment of 58 per cent of patients suffering from endometriosis resolves itself into producing either surgical or radiation castration.

My colleagues and I feel that the ovaries of patients of any age group should not be removed unless it is necessary, but especially not those of patients less than 40 years of age. In spite of strong convictions in this regard, it was deemed necessary to produce castration in 36 per cent of the cases in which patients were less than 40 years of age, because the extensiveness of the endometriosis precluded its complete removal.

If the patients who have minimal or incidental findings of endometriosis were not considered, then it would be found that of the patients who had moderate or severe symptoms and physical findings of endometriosis, more than 50 per cent would require castration to reli[illegible] their symptoms.

Some patients do have the endometriosis confined to one removable adnexum or this plus a few removable implants. There is no middle ground, however; either the endometriosis or the ovaries must be completely removed in order to have reason to expect a surgical cure.

This consideration is of great importance to both surgeon and patient. The young woman who has moderate pelvic discomfort for even six or seven days per month, once she is assured that no serious consequences will result from deferring operation, may prefer to endure this disability rather than run a 50 per cent chance of surgical castration being necessary for a cure. The woman of 36 or 38 years of age may expect an early menopause, and she may be willing to bear her discomfort with the prospects of its early termination. A high percentage of the secondary and tertiary pelvic laparotomies are required because an incomplete operation was done previously for endometriosis.

If the extensiveness of the endometriosis is such as to require castration, the castration is not usually followed by the same intensity of menopausal symptoms as is common in castration for other reasons. Many of these patients will have few, if any, symptoms. This phenomenon is explained in part by the fact that the gradual destruction of ovarian tissue by the endometriosis has progressed, at the time of operation, to such an extent that the patient has been bordering on menopause for some time. During this period she may have unknowingly made a gradual nervous adjustment which the final complete withdrawal of ovarian secretion does not upset.

There is an occasional patient less than 30 years of age for whom it seems advisable to do a palliative operation with the hope of carrying her along to an age at which castration would be less of a tragedy. A few of these patients are completely relieved, and for others an early menopause makes further surgical treatment unnecessary.

In a selected group of 20 cases in which the chief symptoms of dysmenorrhea and dyspareunia were due to deep implants in Douglas' cul-de-sac which could not be removed, presacral neurectomy was done. This was combined with excision of the accessible implants and usually suspension of an adherent retroverted uterus. Owing to careful selection of patients the results of this procedure have been very good.

The difficulties inherent in doing the common pelvic operative procedures in the presence of endometriosis have received very slight attention in the literature. At times the utmost skill is required by the surgeon either to keep out of difficulty or to extricate himself from a bad situation in which he may inadvertently find himself when operating in the presence of extensive endometriosis. In the presence of this lesion mishaps are especially likely to occur.

A few examples of the difficult situations encountered are worthy of special mention. In cases of old pelvic inflammatory disease one can easily elevate an adherent retroverted fundus by working the finger down between it and the rectum. However, in cases of endometriosis one cannot do this without danger of penetrating the wall of the rectum, or of part of the muscularis of the rectum adhering to the fundus. Similarly, in separating loops of small bowel from each other or from the uterus or adnexa, special care must be taken to avoid stripping off part of their musculature before one realizes that one does not have a true cleavage plane.

Often, once the uterus has been removed, there is very little peritoneal covering left for Douglas' cul-de-sac and the lateral pelvic walls. This situation can be remedied by laying the sigmoid in the pelvis and placing a few sutures to hold it there. The pelvis is the normal location of the sigmoid, it suffers from no functional inconvenience from being sutured there and in this location it keeps loops of small bowel from becoming adherent in the pelvis.

Douglas' cul-de-sac may be entirely closed off by the rectum being drawn forward and being densely adherent to the posterior fornix and lowermost part of the supravaginal portion of the cervix. This relationship is usually best left undisturbed. Other things being commensurate, the patient's interests are better served by subtotal hysterectomy than by total hysterectomy, when the latter would entail considerably more trauma and risk than the former. In such a case more than the usual care must be exercised, so that in closing the cervical stump a suture is not passed through the adjacent portion of the rectum.

The vesico-uterine space is often obliterated by implants which cause the bladder to be adherent to the supravaginal portion of the cervix. In separating the bladder, sharp dissection must be used. No line of cleavage is present and it is at times difficult to avoid dissecting away part of the vesical wall or opening the bladder. In closing the vagina or the cervical stump, caution must be exercised lest the suture be passed through the vesical wall It is easy to pass the suture through the vesical wall, since the field is obscured by a bloody ooze and the bladder is usually still attached to the anterior fornix instead of being displaced forward. The most common cause of vesicovaginal fistula is an unrecognized suture in the vesical wall which has been placed while closing the cervical stump after subtotal hysterectomy.

To avoid injury or ligation of the ureters is probably the chief concern of every pelvic surgeon. Endometriosis shares with cervical fibroids first place as the contributing cause of such accidents. In endometriosis three factors contribute considerably to making the ureter more than usually vulnerable to injury. First, improper orientation causes injury to a ureter in many cases. Dense adhesions prevent proper mobilization of the uterus. The field is obscured by spilled tarry material, oozing of blood from innumerable denuded areas and sponging by the assistant. Under these circumstances especial care must be taken to visualize each ureter and to avoid including it with the corresponding uterine artery when a forceps is applied to the latter. Second, involvement of the paracervical tissues by endometriosis results in formation of scar tissue. Contraction of this scar tissue draws the ureter even closer to the cervix, thereby appreciably reducing the normal narrow 2 cm. space between the cervix and ureter where the uterine artery must be clamped. Third, in the ordinary hysterectomy when the cardinal ligaments are put on tension, just before the forceps are placed on the uterine artery, the ureter drops away from the cervix and the uterine artery. Endometriosis causes fixation of the paracervical tissues and lateral pelvic wall so that when traction is made on the uterus the attached ureter, instead of dropping away, is further drawn upward into the operative field.

Proper orientation is essential and the course of each ureter should be known even if it is necessary to dissect it out in its entire pelvic course. If this is done and the fact that in these cases the ureters are more than usually vulnerable is kept constantly in mind, the ureters will seldom be injured.

The chief weapon in preventing errors is the realization that with the setup at hand certain errors are more than usually likely to be committed. With this knowledge such errors can be more certainly avoided.

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Coronary Disease of the Hip*

FREMONT A. CHANDLER, M.D.**
CHICAGO, ILLINOIS

INFARCTION of the head of the femur in the clinical sense is a group of symptoms, dominated by pain, loss of function and bony collapse caused by anoxemia and other deficiency in arterial nutrition of the head of the femur, prolonged enough to result in marked degeneration, even necrosis of bone. Its most frequent cause is abrupt obstruction, thrombosis or embolism of a large branch of the coronary artery.

Two or three times as frequent in men as in women, most cases of femoral head infarction occur between 50 and 70 with fewer cases in the next, earlier and later decades.

Below 40, cases are infrequent but may occur at still earlier ages, even in the 20 to 30 period. Increased recognition of mild ases is greatly increasing the incidence of he disease.

The foregoing paragraphs are in no sense original but are a direct quotation of the definition and incidence of cardiac infarction taken from the 15th edition of Osler's Medicine. The terms "cardiac" and "myocardial" have been replaced by the terms "head of the femur" and "bone." No clearer definition of the pathologic process in the femoral head, due to circulatory failure, could be devised. The pathology of cardiac infarction is so well known to every busy surgeon, that any review is unnecessary. Too frequently cardiac coronary disease becomes the sword of Damocles, hanging over our heads as we go about our regular work.

Christian, in this 15th edition of Osler, goes on to describe how cardiac infarction was recognized in autopsy examinations since the earliest periods of medical history, but that the clinical recognition of this entity is of modern times. Between 1896 and 1912, few isolated cases were diagnosed ante mortem. In 1912, James B. Herrick of Chicago aroused the medical profession to clinical recognition of coronary disease and brought the subject to its place of eminence in medical and lay thought.

Compare the head of the femur with the heart and it is evident that much of the anatomy is similar. The myocardium and the cancellous bone and cartilage differ histologically, but each is composed of living cells requiring oxygenation and nutrition. The heart protrudes into its pericardial sack much in the same manner as the head of the femur protrudes into the synovia-lined capsule of the hip joint. The nutrient vessels of each are extended and have but limited anastomoses. They are, in a sense, end-arteries. The term, coronary artery, by usage, has come to mean almost exclusively the nutrient arterial channels of the heart. The term "coronary" means crown-like or encircling. We still have the term coronary ligament of the liver. When used in this sense, i. e., crown-like or encircling, it aptly applies to the circulation of the head and neck of the femur. A projection of our knowledge of the varied pathologic processes of cardiac muscle to the structures of the femoral head leads to better understanding of the pathology of the hip joint. The terms coxae malum senilis, arthrosis, aseptic necrosis, etc., are descriptive, but they fail to convey true concepts of the pathologic processes present in the femoral head. Such terms are descriptive of the terminal phases of a complex pathologic process, but they do not convey a concept of the sequence of preceding pathologic events.

As in the myocardial lesion, coronary disease of the hip reflects defective circulation and inadequate nutrition of the cancellous bone of the femoral head and neck. The nutrient channels of the femoral head and neck are essentially end-arteries with limited anastomoses. Impairment of circulation, due to vascular obstruction from any cause, is followed by degenerative changes in either myocardium or bone, or in any other tissue. The degree of degeneration and the effectiveness of repair depends upon the extent of the vascular impairment and establishment of an adequate collateral circulation If new vessels develop to sufficient size and extent, repair will be more complete. Fortunately a margin of safety exists in both myocardium and bone, but this factor diminishes with age, the presence of general vascular disease and the limits of repair

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** Professor of Orthopaedic Surgery, University of [illegible]

In the head of the femur, degenerative bone changes lag considerably in their manifestation, due to the very nature of the tissue involved. Degenerative changes of the femoral head, due to interrupted circulation from traumatic dislocation of the hip, may be delayed weeks or even months, both clinically and roentgenologically. The same time lag is present in air embolism, thrombosis, fracture, infection of the hip joint or in any other vascular obstruction. In the presence of general vascular disease, the margin of safety diminishes and the probability of the completeness of repair is less. Repair in bone is a slow process, so well and aptly described by Phemister as "creeping substitution."

The possibility of regaining normal function in the head of the femur, as in the heart, depends upon the completeness of repair. When the magnitude of the compression forces and torque, acting through the head of the femur, is taken into consideration, the importance of complete healing is obvious. In a recent article Inman states that the torque at the hip in abduction in males is 10.00 ± .86 × body weight. In females it is 9.4 ± .97 × body weight. He also states that the pressure on the femoral head when the pelvis is horizontal is 2.4–2.6 × the body weight. This is due to the action of the hip abductors countering the forces at the center of gravity which is medial to the hip joint.

In its embryologic development, the head and neck of the femur protrude into the synovia-lined capsular cuff of the hip joint. This cuff is shorter posteriorly than in its anterior aspect. The articular surface of the femoral head migrates anteriorly and posteriorly, incorporating a portion of the capsule to form the ligamentum teres. Evidence of this is present in reptiles where the reflected ligament persists and in many humans where a distinct retinaculum is encountered. The arterial supply of the femoral head and neck are found in the ligamentum teres, the folds of synovia encircling the femoral neck and in the nutrient channels of the cancellous bone. Some vessels penetrate the epiphyseal plate, others enter the capital epiphysis at its margins. With closure of the epiphysis more blood supply comes from the femoral neck proper.

The trochanteric area of the femur is supplied by freely anastomosing arteries forming the cruciate anastomosis. The medial and lateral circumflex branches of the profunda connect with the inferior and superior gluteal arteries encircling the trochanteric area and capsule of the hip joint. Small perforating branches penetrate the capsule, lie in folds of synovia and enter the margin of the femoral head. These branches, to a degree, may be considered end-arteries, for their anastomoses are, at best, limited. The acetabulum and ligamentum teres derive their arterial supply from the posterior branch of the obturator artery and the acetabular branch of the medial circumflex artery. Anastomoses between the ligamentum teres and the femoral neck are very limited but do exist in some specimens.

Several years ago S. W. Chandler reported observations of the blood vessels of 114 ligamenta teres in subjects averaging 48 years of age. Four were relatively avascular. Eight showed many small vessels. In 16 the vessels were obliterated or sclerosed; 36 had vessels .4–.2 mm. in diameter and 50 1.5–.4 mm. in diameter. These variations of the patency of the vessels of the round ligament are important, for they indicate the limitations of possible anastomoses in many hips.

Venous channels parallel the arterial supply and normally are adequate. The possibility of embarrassment of circulation through the vessels lying in the synovial folds of the femoral neck by increased joint pre
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and oxygenation, a series of degenerative changes ensue. These may be of the mildest degree or of major import, with corresponding loss of hip function. The femoral head loses its ability to resist the tremendous stresses of weight-bearing and muscle action and collapses in varying degrees. The loss of contour alone introduces an unending series of additional stresses, with further loss of function and increasing pain. When the nutritive insult is severe, little repair follows and necrosis is complete. Should this insult be less in degree, repair occurs. This is a slow process and rarely advances to complete restoration of the bony contour of the femoral head.

The objectives of therapy in "coronary disease of the hip" are the restoration of the functions of weight-bearing and of normal movement at this articulation.

Reduction of the "load" by reduction in body weight and the use of crutches or traction is indicated. General nutrition should be optimum.

Attempts to improve the local circulatory deficiency should be considered. These consist of multiple drilling of the femoral neck to aid revascularization. This gives only a limited promise of improvement. Implantation of adjacent muscle into the neck of the femur as an additional source of blood supply has been advocated by Walter Stuck of San Antonio, Texas.

Alteration of the mechanics of the hip joint by osteotomy, reconstruction of the hip (Whitman) or cup arthroplasty, offer a means of preserving the function of motion. In selected cases, normal function may be attained, but too frequently the result falls short of what we might hope to accomplish.

Sacrifice of the motion of the hip joint by some form of hip fusion operation is probably the best solution in unilateral cases. The best technic is the erasement of the hip joint combined with massive iliac grafts and internal fixation. Bony fusion is dependent upon new bone formation across the joint line. Because of the very nature of the bone at this area, obstacles are encountered and fusion is difficult to accomplish. The hip is fixed in a position facilitating sitting as well as walking. Consideration of the flexibility of the lumbar spine must not be overlooked. The many and varied operative approaches designed to alleviate the dysfunction of the hip joint which results from disturbances of nutrition, reflect the complexity of this problem.

SUMMARY

In many respects the sequence of degenerative pathologic changes following impairment of the circulation in the head and neck of the femur parallels similar processes encountered in cardiac coronary disease. It is hoped that the concept of "coronary disease of the hip" will afford a better understanding of many of the pathologic processes encountered in the head and neck of the femur.

SOMMAIRE

Sous beaucoup de rapports, l'évolution des changements pathologiques et dégénératifs qui surviennentdans la tête et le col du fémur ressemble aux changements semblables qu'on observe dans la maladie coronaire du coeur. Il est à espérer que la conception de "maladie coronaire de la hanche" nous aidera à mieux comprendre beaucoup des procédés pathologiques de la tête et du col du fémur.

SOMMARIO

Sotto molti rispetti la successione delle lesioni degenerative causate da un ostocolo nella circolazione della testa e del collo del femore recorda quella che ricorre nella lesioni cardiache da ostacolata circolazione coronaria. L'A. si augura che il concetto di "malattia coronaria dell' anca" permettera' una migliore comprensione di numerosi processi patologici che occorrono nella testa e nel collo del femore.

RESUMEN

En muchos respectos los cambios producidos por las degeneraciones patologicas resultantes de las afecciones circulatorias de la cabeza y cuello del femur se asemejan mucho a las producidas en las afecciones coronorias del corazon. Por esta razon el autor introduce el concepto de enfermedad coronaria de la region femoral favoreciendo asi la elucidacion de los procesos patologicos que afectan la circulacion de la cabeza y cuello del femur.

Pes Tortus Congenitalis

GERALD L. BURKE, M.D., F.I.C.S.
VANCOUVER, CANADA

ON the North American continent little interest has been shown in the method of treating clubfeet originated by Mr. Denis Browne and now universally used in Great Britain. At the Children's Hospital in Vancouver we started to use this method in 1939 and since have treated over 500 cases. These are the excuses for launching forthwith on the following discussion.

For many years treatment has been directed against what were regarded as the triple deformities of clubfeet—adductus of the forefoot, varus of the hindfoot and equinus of the whole foot.

We are all too familiar with plaster casts which were wedged and wedged, reapplied and wedged and wedged; the surgery of soft tissue which followed; the later surgery frequently undertaken to modify or undo the effects of surgery previously done; and finally, when the bones were sufficiently mature, the osseous campaign. Too often the end-results were stiff, partially deformed and undersized feet with underdeveloped legs, particularly noticeable in unilateral cases in contrast with the chubby normal one. I do not believe that a normal foot and leg has ever been secured anywhere, at any time, or by anyone, by the use of wedging casts or surgery or by any combination of wedging casts and surgery.

The unsatisfactory results were due to a wrong conception of the etiology and of the deformity itself, leading to inadequate methods of treatment. Many curious and unsupported theories of the etiology have been advanced; for instance, that they are due to muscle imbalance—when no type of actual or theoretical imbalance could produce this deformity. Another school of thought believes that the deformity is due to gross lesions of the central nervous system, but no lesions have ever been demonstrated, and once the foot is corrected the muscles function normally and yield neither symptom nor sign of central nervous system deficiency.

The logical theory is the oldest. It was propounded by Hippocrates who stated that the deformity of the feet was due to their molding by the wall of the uterus. This conception has been stoutly championed by Denis Browne, and his treatment based upon it has been incomparably the most successful. The evidence is in its favor. The shape of tissues can be radically altered after birth by external pressure; for example, the tiny feet that Chinese ladies used to affect due to the tight bandaging of their feet in childhood. Similarly, pressure is capable of altering the shape of parts of the body before birth. The normal newborn child shows evidences of this pressure in the dimples or areas of compressed and adherent tissues over the knuckles and the outer surfaces of elbows and knees. Also we have all observed the calcaneovalgus position of the normal newborn's feet, the backs of the feet having been forced upwards and outwards towards the outer side of the leg by the pressure of the wall of the uterus. It needs only light pressure on the sole of the newborn's foot to cause the little toe to touch the outer side of the leg near the fibula. This position is automatically self-correcting as the child grows older, because the weak muscles which might maintain it are opposed by the most powerful muscle groups below the knee.

If a child does not take the pressure on the soles of its feet, the only part of the foot on which the pressure can be taken, is on the outer side of the foot and some degree of clubfoot will result. The movements of the child in utero make no difference to the relative position of the feet. There is not enough room as a rule for a child to move from the clubfoot position to calcaneovalgus.

In this connection I have noted with pleasure, not unmixed with sorrow, that in obstetric textbooks the sketches of infants in utero show the child's feet invariably neatly folded in the position of clubfeet. All these children would have clubfeet. But photographs of frozen sections all show normal infants taking the pressure of the uterine wall on the soles of their feet. There is a magnificent specimen in the University College Hospital in London, in

which the anterior half of the uterus is replaced by glass which clearly demonstrates this point. I would hesitate to suggest that the foregoing shows a curious limitation in the powers of observation in our obstetrical brethren.

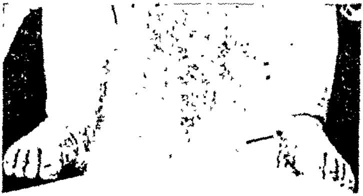
Now if the feet are twisted inwards, and this is the only other position they can assume if they are not in calcaneovalgus, so that the outer side of the foot and not the sole takes the pressure, a series of deformities results varying from slight to severe, but all corresponding to the curve of the uterine wall on their outer side. The foot as a whole is molded to this curve. The forefoot is turned inwards; the heel is turned inwards under the ankle; and the foot is plantar flexed in the position of equinus due to the inclination of the various joints in the ankle region. Here

we have the middle range of the series of deformities known as "clubfeet," which ranges from a simple inturning of the forefoot through "talipes equinovarus," a term which applies accurately only to the middle range of these deformities; in the most severe degree, the forefoot swings around until the big toe points straight upwards along the tibia. In bilateral cases it is interesting to note that the mutually deformed feet can be fitted together after birth in the same position that squeezing by the wall had molded them into before birth.

The term "talipes equinovarus" is a poor one, because "talipes" means "heel-foot" or "ankle-foot," a singularly pointless term, and "equinus" and "varus" are secondary elements in the deformity of those cases in which they are present. The important element is the bending of the foot on its longitudinal axis. In the mild degrees of clubfeet there is neither equinus nor varus but simply inturning of the forefoot, and in the most severe degrees the equinus is reversed, as in those cases where the big toes lie along the tibia. "Clubfeet" is an unpleasant term. I have tried to think of a better term than either of these two, one of which is inaccurate, the other insulting. The best I can do is "congenital twisted foot" or "pes tortus congenitalis."

When we started to use the splints, Browne had written a number of graceful articles, full of literary and historic allusions, with many a Latin quotation, many a reference to the abstrusities of physiology, but only indicating obliquely the use of the splints. His articles are a little difficult to follow. I am afraid that he expects the erudition of his readers to equal his own. However, deliberate and painstaking excursions through Browne's *articles finally yielded a reasonable knowledge* of his technic, which has been clarified by experience and further excursions.

In the treatment it is necessary to concentrate on the most important element of the deformity, which is the curving inwards of the longitudinal axis of the foot. The most important part of this curving is in that portion of the foot lying in front of the ankle. If this part of the deformity is corrected, *all else shall be added unto the foot; i. e.*, the secondary elements of equinus and varus are automatically corrected, if they are present. The converse does not hold. It is only too easy to correct the equinus and varus without correcting the fundamental deformity. This was the common end-result in plaster treatment, and if the child were observed sitting with the legs hanging free, it would be noticed that there was little varus or equinus, but *that the feet were curved inwards to varying* degrees. The *normal infant in the same position holds its feet turned outward 10–20 degrees* This position, the feet held free and turned out 10–20 degrees, is the aim of treatment *and the criterion of correction.* One cannot adequately judge the feet in the standing position, for they can be arranged accidentally or possibly intentionally to give a false impression.



Driving the forefoot around outwards, in the reverse direction to the curve that it followed in attaining its deformed position, must then be the aim in treating the deformity of structure.

But there is not only structure to consider in a disability of this sort; there is also function. The most important interference with function comes from the lack of muscle balance previously mentioned, the powerful *muscles favored and the weak muscles*

stretched. To correct a disturbance of this sort it is not enough to correct the deformity that has caused it; the muscles must be made to work against each other in the corrected position. Holding the limb motionless in plaster has no effect in equalizing muscle tone once it has been upset.

The Browne splint fulfills these conditions by allowing and stimulating the child to kick vigorously in the splint, thus working its own feet into shape. We apply the splints at the earliest possible moment. As "early as possible" is important, because even a few weeks makes a great difference in the ease of accomplishing full correction. If this principle of the earliest possible application were carried to its ideal and logical conclusion, one should, in a breech birth, apply the splints before the delivery of the after-coming head!

The splints are applied as early as possible, about 10 days of age is most practical, as the infant has adjusted itself to its new environment and can be weaned by that time. The feet are painted with tincture of benzoin compound and strapped separately to the foot pieces with adhesive tape. Then the foot pieces are attached to the cross-bar without any deliberate attempt at correction and in the neutral position. The child is allowed to kick in the splints for four or five days, and during the next two weeks, more or less, the feet are gradually externally rotated to 90 degrees. After this position has been maintained for a few days, the feet are manipulated without anesthetic, using both hands, one supporting the tibia, the other pushing the sole of the foot upwards and outwards. The manipulation may conveniently be completed by using one hand, squeezing the foot and leg together until the little toe touches the leg. Following this, the splints are not applied for two days, as there is usually a little swelling of the foot.

The adhesive is maintained for about three months, day and night. The feet should not be washed. Let the debris and tincture of benzoin accumulate and you will have little trouble with the skin. Change the adhesive, carefully and delicately, daily at first if necessary, as soon as the heel begins to slip out of the adhesive. Gently correct the position of the foot before reapplying the adhesive. A general rule is three changes a week for two weeks, twice a week for the next month and once a week for two months. Usually the feet are stable in the completely corrected position in two to three months; then boot splints are applied day and night until the child is ready to walk. The splints are removed daily, of course, to bathe the child, at which time the manipulation is done. Finally the boot splints are applied only during sleeping periods for a further period of a year. As soon as the child is walking, ¼ in. outside tilts on the soles of heelless

(Continued on page 51)

Partial Gastrectomy in Treatment of Perforated Gastric and Duodenal Ulcers

ANTONIO BOBBIO, M.D., F.I.C.S.*
TURIN, ITALY

IN his recent book "Emergency Surgery" (1944), Percival Bailey takes the following position in regard to the use of partial gastrectomy as an emergency procedure for treatment of perforated gastric and duodenal ulcers:

> B. Partial Gastrectomy for perforated peptic ulcer is practised by some Continental surgeons, who can produce statistics which make my mortality figures appear stupendous. It is my endeavour to keep an open mind on methods I have not tried; on this occasion I feel justified in condemning this practice whole-heartedly. I could bring many arguments to justify this attitude, but this is not the place to do so. Let it suffice that not a few patients remain perfectly well after simple suture; that partial gastrectomy, even in the most expert hands, is an operation bristling with incidental complications, many of which can be forestalled by proper pre-operative treatment; that if a patient is well enough to undergo a formidable surgical procedure, how can he possibly fail to respond to closure of the perforation and await reasonable necessity for further surgical measures.

In the book by Spivak, "The Surgical Technique of Abdominal Operations" (1947), the use of partial gastrectomy in treatment of perforated peptic ulcers is considered in a somewhat more benevolent manner. The author however does not seem to speak from personal experience, but rather to base his discussion on the results published by the "continental" surgeons, in particular Yudine and Haberer.

Recently I have had the opportunity of reviewing the latest American and British literature on this subject, and it is my impression that the absolute majority of the Anglo-Saxon surgeons are in agreement with the opinions of the two authors above quoted. A detailed analysis of all the papers written on this subject would therefore appear superfluous. I shall only mention an article by Bisgard (1945) in which the following criteria are listed for the choice of partial gastrectomy in emergency gastric surgery:

1. Perforated gastric carcinoma, with delimited resectable lesions.
2. Perforated peptic ulcers associated with recent or simultaneous gross hemorrhage.
3. Perforated peptic ulcers associated with fixed pyloric obstruction.
4. Recurring perforations.
5. Perforations with insignificant soiling.
6. Very early perforations, occurring in the very young.

In the British and American statistics, the mortality figures for the palliative operations vary between 10 and 20 per cent. This is in spite of all the advances in suture technic, of the abandonment of associated gastrojejunostomy which is recognized to be at least useless if not harmful, of the use of modified, less traumatizing laparotomy incisions, and the most modern pre- and postoperative care.

In addition, one should not forget that in about 50 per cent of the cases of perforated gastric and duodenal ulcers treated with palliative surgery, the symptoms created by the persistence of the ulcer will not disappear. In these patients, more surgery and therefore more surgical risks are often necessary.

It would seem that similar results following palliative surgery cannot possibly be considered satisfactory by the surgeons of the Anglo-Saxon countries. This is even emphasized by the fact that Italian surgeons, in spite of the decidedly unfavorable circumstances of these recent years, are now able to publish results showing a lower mortality rate and a higher number of cures following the use of partial gastrectomy.

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* From the University of Turin Medical School, Department of General Surgery.

It is well known that the first partial gastrectomy for perforated ulcer was reported in 1919 by Haberer. Since that time, this procedure became popular among German surgeons because of the superior efficacy of gastric resection in the treatment of uncomplicated peptic ulcers. American surgeons are certainly familiar with this trend in the German clinics, principally through a statistical survey in a paper published in America by Graves. This author in 1933 analyzed 4,402 cases of gastric and duodenal perforations from the most important Austrian and German medical centers. Among these there were 775 cases treated by partial gastrectomy, with a total mortality of 18.2 per cent. At that time this figure was considered low when compared with the 6–14 per cent mortality then commonly following gastric resection for uncomplicated peptic ulcers. In fact, this was attributed to the selection of cases for partial gastrectomy and to the recognized skill of the German surgeons.

This should not lead one to the conclusion that in Europe the use of partial gastrectomy in treatment of perforated ulcers was accepted without opposition. Since 1919, the pendulum has repeatedly swung back and forth between simple suture and gastric resection.

As for the French surgeons, the problem of use of a radical operation in treatment of perforated peptic ulcers was probably first raised by Brocq. This author in 1936 presented at the Académie de Chirurgie of Paris, a paper by two Greek surgeons, Carayannopoulos and Christeas, who reported 18 cases of gastric perforations, in which 13 partial gastrectomies were performed without a single death. Brocq accompanied this paper with a careful statistical analysis of 1,220 partial gastrectomies in cases of gastric or duodenal ulcers perforated in the free peritoneal cavity, which he had collected from the medical literature. These cases were then compared with 747 other, clinically similar, cases collected from the French literature, in which only palliative surgery was used. Among the 1,220 partial gastrectomies there were 176 deaths, (14.4 per cent). Of these, 43 deaths occurred among 423 patients operated upon during the first 12 hours following perforation (10.1 per cent); the other 133 deaths represented 38.6 per cent of the 797 patients operated on more than 12 hours after perforation. On the other hand, among the 747 patients treated by palliative surgery, there were 191 deaths, of which 14 per cent had been operated upon during the first 12 hours, and 54.3 per cent came to operation somewhat later.

Taking into account the age of the patients, following gastric resection the mortality was 15 per cent below 45 years, and 25 per cent above this age, while in cases treated by palliative surgery the mortality was, respectively, 20 per cent and 43 per cent. Brocq's survey leads to the conclusion that under proper conditions about 60 per cent of all cases of perforated peptic ulcers can be treated by partial gastrectomy, and that the risks involved are not greater than those to be expected following more conservative surgery.

Furthermore, it must not be forgotten that gastric resection protects the patient from certain complications of palliative surgery, such as hemorrhages, recurrent perforations and malignant degeneration of the ulcers. Prognosis of patients who had only palliative surgery is not always good: 50–60 per cent continue to suffer from persistent or recurrent ulcers, and a good number of them must eventually undergo a radical operation. It is because of this that Brocq concluded that partial gastrectomy is indicated in treatment of perforated gastric and duodenal ulcers, when certain favorable conditions exist (i.e., good general condition of the patient, little peritoneal spillage, topography of the ulcer, good anesthesia, technical skill of the surgeon). However, notwithstanding the favorable conclusions reached by Brocq, there apparently were only few French surgeons who decided to resort to gastric resection for emergency treatment of perforated ulcers. Mialaret, in 1944, reported on a series of 75 partial gastrectomies with 9.3 per cent mortality, while Lenormant in 1942 published a series of 174 cases of perforated peptic ulcers, all treated by palliative surgery, with 24 per cent mortality, and with 13 out of 42 follow-up cases in which further surgery was necessary. A Belgian series of perforated peptic ulcers published by Samain in 1946 reports 23 partial gastrectomies without deaths.

The Scandinavian surgeons follow exactly the trend of Anglo-Saxon surgery. They apparently practice almost exclusively simple suture of the perforation, and their mortality *figures are quite low: Troell 3.9 per cent;* Hellstrom 8 per cent; Brun and Landelius 15.4 per cent.

In Italy, the first gastric resection for perforated ulcer was successfully performed in 1922 by Gandusio in Trieste. Since then, the reported cases have multiplied, although not without frequent disagreement. In Rome, under the influence of Alessandri, partial gastrectomy was for the first time applied on a large scale. The surgical group of Turin soon followed this trend, following the teaching of Donati and Uffreduzzi. It is well to know that since 1937 all Italian surgeons have adopted the use of gastric resection in treatment of the uncomplicated gastric and duodenal ulcers, to the extent that the operation is performed on 70–90 per cent of all ulcer patients who undergo surgery. The mortality following gastric resection in these uncomplicated cases is low. It extends from a minimum *of 2 per cent to a maximum of 5–6 per* cent. All the above makes it easy to understand the generally favorable acceptance of the use of partial gastrectomy, and also in treatment of perforated ulcers. In the hands *of different surgeons, the mortality rates following* gastric resection for perforated ulcers vary, as shown in the list below:

Ciancarelli	(1935)	21	partial	gastrectomies,	5%	mortality
Pototschsig	(1935)	20	"	"	15%	"
Stipa	(1937)	55	"	"	17%	"
Peracchia	(1938)	40	"	"	7.5%	"
Margottini	(1938)	54	"	"	14.8%	"
Benedetti-Valentini	(1938)	12	"	"	0%	"

However, the total mortality rate including both radical and palliative surgery varies in the hands of the same surgeons, from 7.6 per cent (Ciancarelli) to 17 per cent (Benedetti-Valentini) and 18.3 per cent (Stipa). These figures come close to the average mortality rates reported in the statistics of surgeons using palliative surgery alone. The two largest series published in Italy to date include 817 cases of perforated gastric and duodenal ulcers operated on in the emergency wards of the Ospedale Maggiore of Milan. They have been reported respectively by Della Mano (406 cases) and Caminiti (411 cases). Of them, 95 were treated by gastric resection with a mortality rate of 30 per cent.

By far the most important and most convincing series of cases of perforated gastric and duodenal ulcers, speaking in favor of gastric resection as treatment of choice, is that of the Russian surgeon Yudine. Already in 1939 he reported on a personal series of 937 partial gastrectomies, with a total mortality of 8.9 per cent, as compared with 435 palliative operations followed by a mortality of 31.7 per cent This is certainly the largest series to come out of a single institution, and as a result of the work of a single surgeon. There is no doubt that the efficient and highly specialized organization of Yudine's department is to be counted among the paramount factors that made these excellent results possible.

It is the aim of this report to prove that even in surgical institutions in which such a high degree of specialized organization does not exist, it is possible to achieve results simi*lar in quality, if not in quantity, to those* published by Yudine.

In the Surgical Department of the University of Turin Medical School, under the directorship of Uffreduzzi and later of Dogli*otti, the treatment of peptic ulcers has for* several years been directed toward partial gastrectomy. Our immediate and distant results have been excellent. In our clinic, the same trend has guided us also in the treatment of perforated peptic ulcers since 1939; that is since our staff started having an active part in the emergency service of the Ospedale San Giovanni of Turin.

Now that the disastrous war years are over, and our clinic is in the process of reorganization, we have decided to re-examine the results of our past work, in order either to confirm or modify the therapeutic trends that we had been following in the past years. The results of the present analysis of the cases of our series were first presented by me in collaboration with P. G. Calvi and G. Psacharopulo, at a meeting of the Società Piemontese di Chirurgia. On this occasion, other surgeons, chiefs of other surgical services in our same hospital, contributed with a discussion of their own series (see Table 1).* Out of the 211 cases of Table 1, there were 203 males and 8 females; the ages of 145 of these ranged between 30 and 50 years.

From this point on, any further discussion will refer solely to the 52 cases from the Surgical Department of our Medical School. In regard to the topography of the perforations, there were 26 duodenal ulcers, 16 pyloric ulcers and 10 gastric ulcers, most of which were on the lesser curvature. One perforated ulcer of the greater curvature was observed, located in the upper one third. (Besides these 52 cases of benign peptic ulcers, we had one case of perforated carcinoma of the pyloric antrum, which was treated successfully by gastric resection. This case was reported separately in greater detail by Psacharopulo.)

Table 2 is set up to show the importance of the time element in the choice of method of surgical treatment and in postoperative mortality. This table emphasizes that early operation is the most important single factor for improvement in prognosis and for applicability of elective surgery. Better education of the public and better understanding by the general practitioner of the diagnostic and therapeutic problems of the acute abdomen, are essential in this respect. From the point of view of diagnosis, little can be said here that is not already known.

A cirrhotic patient with tremendous ascites was admitted 30 hours after perforation of a pyloric ulcer. Upon admission, there already were signs of generalized peritonitis, and of circulatory insufficiency. In this case, the rapid spreading of the peritonitis was certainly favored by the presence of the ascitic fluid.

TABLE 1

	Date	Total no. of cases	No. of Deaths	%	Gastric Resections	No. of Deaths	%	Simple Suture	No. of Deaths	%	Suture & Gastro-jejunostomy	No. of Deaths	%
Surgical Department of the University of Turin Dogliotti-Bobbio	1939 1947	52	4	7.69	29	0	0	5	3	60	18	1	5.5
Surgical Division A Bertocchi	1936 1947	87	9	10.3	51	4	7.8	8	2	25	28	3	10.7
Surgical Division B Milone-Virando	1936 1947	72	12	16.6	56	4	7.1	12	6	50	4	2	50
Total		211	23	10.8	136	8	5.8	25	11	44	50	6	12

In all our cases of perforation into the free peritoneal cavity, the typical sharp stabbing pain, with sudden onset, was always present, both in patients without previous gastric symptoms, and in individuals who for years had been recognized as ulcer patients. In our experience, the absence of the sudden, sharp stabbing pain occurs only in walled-off perforations.

Another constant symptom in our cases, and one essential for diagnosis of a perforated viscus, is muscular rigidity of the epigastric region. Its absence should suggest a reasonable doubt of the existence of a perforation.

As a rule, we try to determine the presence of gas in the hepatic region by percussion. This was seldom demonstrated in our cases, most of which were early perforations. In some cases, flat x-ray plates of the abdomen were of considerable help in the effort to determine the presence of free gas in the peritoneal cavity. However, our diagnosis and respective decision to intervene surgically were in general based on clinical symptoms and physical examination. In some cases, laparotomy showed *walled-off perforations, or* ulcers threatening perforation but not yet actually perforated. These cases are not included in the present study.

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* The Ospedale Maggiore di San Giovanni in Turin is a [illegible] city hospital, including several medical and surgical divisions, divisions of the various specialties, [illegible] departments staffed by members of the Faculty [illegible] of the University of Turin.

In most patients, there were some signs of circulatory collapse, such as rapid pulse, low blood pressure, dyspnea, pallor, diffuse perspiration, subnormal temperature. It is well to remember that the presence of fever, especially in early stages, should direct the attention of the surgeon to the possibility of other acute abdominal diseases such as acute appendicitis or cholecystitis, rather than of perforated peptic ulcer. A marked circulatory insufficiency before operation was never observed in our cases.

TABLE 2

Hours Since Perforation	Total no. of Cases	Cured	*Dead*	Gastric Resection		Simple Suture		Suture & Gastrojejunostomy	
				Total No.	*Dead*	*Total No.*	*Dead*	*Total No.*	*Dead*
1–3	7	7	—	7	—	—	—	—	—
4–6	16	16	—	13	—	—	—	3	—
7–12	11	11	—	7	—	—	—	4	—
13–24	15	14	1	2	—	4	1	9	—
Over 24	3	—	3	—	—	1	1	2	2
Total	52	48	4	29	—	5	2	18	2

The general conditions of the patients are *not necessarily in direct relationship with the* time elapsing since perforation. This is obvious, if one considers the various possibilities, such as small perforations with minimum spillage of gastric content, compared with larger perforations; perforations in young and healthy individuals and perforations in patients weakened by months or years of gastric disease; perforations occurring after copious meals or on empty stomachs; perforations in patients with hyperacidity or with hypoacidity, and associated low or high bacterial content of the gastric juices.

It is therefore evident that the general condition of the patients depends on a number of factors, among which the time element is not necessarily the most important. Before deciding on the type of surgical treatment to be used in the individual case, all these factors must be evaluated by the surgeon.

The final decision however can be made only at the operating table after the abdomen *has been open, on the basis of the topography* of the perforation, the amount of spillage of gastric contents, the quality and quantity of the exudate, the inflammatory hyperemia of the serosa, etc.

Even in cases in which the general condition is only fair, certain findings should suggest radical rather than palliative surgery. These findings are, for instance, multiple perforations, rare association of perforation and massive hemorrhage, and possibility of malignancy.

Conversely, resection may be contraindicated even if the general condition of the patient is favorable. Such instances are: a very high or low ulcer; extensive inflammatory masses surrounding the perforated region *with matting to neighboring viscera*; marked obesity; etc.

In our series, no deaths were observed following partial gastrectomy (29 cases, see Tables 1 and 2). In most patients, the postoperative course was uncomplicated. However, we had two duodenal fistulas due to the reopening of the duodenal stump; both healed in about 10 days, one spontaneously, the other following treatment with insulin. In all cases, the resections were of the Polya type; in only one case, an antecolic gastrojejunostomy was performed because of a short mesocolon; in all other cases, the gastrojejunostomy was retrocolic. In most cases, a small rubber drain was placed against the duodenal stump, to be removed on the sixth day. Later, however, our experience suggested that drainage is not necessary, especially if a satisfactory closure of the duodenal stump has been achieved. For this reason, no drainage was used in some of the more recent cases.

We have often used sulfa drugs, dusted locally into the peritoneal cavity. In our last three cases, penicillin therapy was started immediately after operation.

As for the cases treated with palliative surgery, *simple suture* of the perforation was used in five cases: four of these were gastric ulcers situated very high in the lesser curvature, for which a difficult subtotal resection would have been the alternative; the fifth case was a cirrhotic patient. Four were admitted between the 13th and the 24th hour following perforation. Two of these died. This shows that simple suture was used only in late cases or in cases in which gastrectomy was otherwise contraindicated for technical reasons. The perforations were closed with sutures and then buried with several layers of seromuscular stitches, which in turn were covered with portions of the greater omentum. In one of the cases which recovered, the perforation on the greater curvature had very friable margins which did not allow the usual closure with sutures. In this case a flap of omentum was packed into the perforation and sutured to the serosa of the surrounding gastric wall.

Of the three patients who recovered following simple suture of the perforation, two were followed for a considerable period. One of the two is alive and well three years after the operation. The other (in whom the perforation was situated high in the lesser curvature) continued to complain of pain and gastric distress, for which about 10 months following the first operation he underwent a partial gastrectomy because of recurrence of the ulcer which was found to have penetrated into the pancreas. The ulcer was removed with the resected portion of the stomach. However, after only a few months of subjective relief, the patient was re-admitted with symptoms of neoplastic involvement of the remaining stomach, including the gastrojejunostomy, of which he died in a short time. The exact primary focus of the malignancy was not determined.

Suture of the ulcer associated with gastrojejunostomy was used in 18 patients, 7 of which were operated on during the first 12 hours, 9 between the 12th and 24th hour and 2 after the 24th hour. Only the last two died, all others recovered (see Table 2). Of 18 perforated ulcers, 16 were duodenal ulcers, and in these gastrojejunostomy was made necessary by the stenosis of the duodenum caused by the numerous layers of inverting suture. The other two were ulcers of the pyloric antrum. In some of these cases, an excision of the fibrosed margin of the ulcer was made before suturing it. The gastrojejunostomy was made as usual, bringing a short jejunal loop through the transverse mesocolon. Only in one of the less recent cases, a Murphy button was used successfully, and the patient recovered.

In the last two years, it has been our tendency to use partial gastrectomy also in those cases which previously we would have treated by suture of the ulcer plus gastro-enterostomy. In fact, it is now our belief that the latter method does not differ from the former as to immediate gravity or to the time necessary to perform the operation, without presenting the same advantages.

In the most serious cases, we favor the use of simple suture of the perforated ulcer, without accompanying gastro-enterostomy.

Because of the shifts in population, caused by the war, it has been difficult to obtain information on many of the older patients operated on by this palliative method. Those operated on more recently are at present in good condition, with the aid of careful diet.

However, study of the various published statistics shows a high incidence of recurrence following suture of the perforated ulcer, plus gastro-enterostomy. Among the most serious complications is perforation into the free peritoneal cavity of a marginal or jejunal ulcer. All experienced surgeons are familiar with the seriousness of this condition, and with the technical difficulties involved in its surgical treatment. In all our cases treated by suture of the ulcer and gastro-enterostomy, we left a rubber drain at the site of perforation. However, we never drained regions that were not in the immediate vicinity of the perforation, nor any of the peritoneal recesses.

The peritoneal fluid was in general removed by simple suction, with the least possible handling of the tissues, and without use of any irrigation of the peritoneal cavity. We agree on the tremendous importance of having good anesthesia to achieve the best operative results. We have used general anesthesia with ether; local anesthesia either alone or supplemented by general ether anesthesia toward the end of the procedure to facilitate the closure of the abdomen; spinal anesthesia; and the peridural anesthesia of Dogliotti. In one case, we felt that the use of spinal anesthesia contributed to the onset of circulatory insufficiency, of which the patient died shortly after operation. In general, we prefer either local or peridural anesthesia, if necessary combined with small amounts of ether toward the end of operation.

What has been said in the preceding paragraph must be evaluated in the light of the knowledge that the use of anesthetic gases is not yet widely known in Italy, where anesthesia has not yet reached the dignity of an independent specialty.

Most preoperative preparation was limited to administration of preanesthetic medication, in general 10–20 mg. morphine. A few cases received blood transfusion before operation. Most patients were given blood transfusions and, in the recent cases, plasma transfusions immediately after operation. Postoperative treatment did not differ otherwise from what is routinely done following operation on the gastro-intestinal tract, and the postoperative course in most cases was surprisingly smooth.

CONCLUSIONS

We report a series of 52 perforated gastric and duodenal ulcers, treated surgically. Twenty-nine of these patients who represented a first choice because of favorable conditions of time, general health and topography of the ulcer, were treated by partial gastrectomy without a single death. Eighteen patients were treated by suture of the perforation and gastrojejunostomy; in this group there were two deaths, both in patients operated on more than 24 hours following perforation. Probably with the experience we have now, we would do subtotal gastric resections on at least half of the patients in this second group. A third group of five patients was treated with simple suture of the perforation. Two of the five died. This group represented the poorest risk, and we feel that in this respect we were fortunate to have saved three-fifths of them.

Our series of 52 cases included good and bad risks, we feel therefore that our total mortality of 7 69 per cent has to be considered a good result, comparable with the best modern statistics.

The causes of death in our cases were one circulatory insufficiency immediately following operation, in a patient under spinal anesthesia operated on by simple suture about 18 hours after perforation; one bronchopneumonia, six days following suture plus gastro-enterostomy performed 40 hours after perforation; two cases with diffuse peritonitis already at time of operation, performed, respectively, 30 and 50 hours after perforation. (In this epoch no penicillin was available in Italy.) Our results have further convinced us that, in the hands of trained surgeons, partial gastrectomy must be the method of choice in treatment of perforated gastric and duodenal ulcers.

Gastric resection has the following advantages:

(a) It removes the ulcer.

(b) It exposes all peritoneal recesses adjacent to the stomach, recesses where gastric contents and peritoneal exudate usually are collected, allowing a good cleaning of the peritoneum.

(c) It offers the maximum safeguard for the future of the patient, because it is followed by the greatest number of cures.

I would like to suggest here that the results reported by the other two surgical services of our hospital, directed by Bertocchi and Milone, have been no less favorable (see Table 1).

SUMMARY

The author reports on a series of 52 cases of perforated gastric and duodenal ulcers treated in the Surgical Department of the University of Turin Medical School. In 29, subtotal gastrectomy was performed, without a single death. The other 23 were treated either by simple suture of the perforation or

by suture and gastrojejunostomy with four deaths.

Reference is also made to two other series of perforated gastric and duodenal ulcers, observed during the same time in two other surgical services of the same hospital. These series include, respectively, 87 cases (of which 51 were treated by gastric resection with 7.8 per cent mortality), and 72 cases (of which 56 were treated by gastric resection with 7.1% mortality). The combined figures include therefore 211 cases of perforated gastric and duodenal ulcers, of which 136 were treated by gastric resection as an emergency procedure. The total mortality in the 211 cases was 10.8 per cent. The mortality in the group of 136 gastric resections was 5.8 per cent.

RIASSUNTO

Viene presentata una serie di 52 casi consecutivi di perforazione di ulcera gastroduodenale osservati nella Clinica Chirurgica dell'Università di Torino. Di essi 29 furono trattati con la resezione gastrica senza mortalità. Gli altri 23 furono trattati con metodi palliativi (sutura dell'ulcera associata o no alla gastro-entero-anastomosi) con 4 decessi. Questi risultati vengono confrontati con due altre serie di perforati gastro-duodenali, trattati in analoghe condizioni ambientali e nello stesso periodo; rispettivamente 87 casi (51 trattati con gastrectomia—mortalità 7.8%) e 72 casi (56 gastrectomizzati—mortalità 7.1%).

Si tratta pertanto di 136 gastrectomizzati su di un complesso di 211 casi di perforazioni gastro-duodenali con una mortalità del 5.8%. La mortalità complessiva dei 211 casi é stata del 10.8%.

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All those desiring to show motion pictures at the Rome Assembly are advised to communicate with the General Secretary of the International College of Surgeons, 850 Irving Park Road, Chicago, Ill.

Those wishing to send scientific exhibits, which will be returned, should communicate with Mr. J. J. Boris, 1776 Broadway, New York City. Mr. Boris will arrange for return of these exhibits.

Treatment of Inveterate Cystitis*

RAYMOND DARGET, M.D., F.I.C.S.**
BORDEAUX, FRANCE

ONE of the worst conditions that a patient may ever endure consists of inveterate, acute cystitis, which resists all medical therapy. Such cystitis, in most cases, is caused by tuberculosis, and the acuteness of symptoms can be so severe that the repercussion upon the general condition is tremendous, and the evolution of the illness is therefore favored. The poor food supply in France during the last years has occasioned a great increase of these cases, and has obliged us to undertake a special fight against them.

Sometimes coli can cause acute cystitis or there may be an inveterate cystitis with pyuria without bacteria. In either of these it may be impossible to identify Koch's bacillus. Among these last cases some are certainly caused by tuberculosis and remain refractory to all treatment; others, however, completely similar in appearance, may be cured by intensive treatment with sulfonamides, either alone or in combination with penicillin.

In the final instance, after we have vainly tried all types of medical treatment to relieve exhausted patients who pass water painfully every 10–15 minutes during the entire day, we must rely on surgical procedures. Among the possibilities offered by surgery, some methods are not new. These are cutaneous ureterostomy, and intestinal transplantation, in which American surgery particularly has realized so much progress. I do not intend to discuss the advantages or inconveniences of these two methods, but I wish to speak of two methods which are now in vogue in France. These are (1) the infiltration of the nervae erigentes with a novocaine solution by a process personally developed, and (2) the denervation of the bladder.

The latter procedure consists of the bilateral section of the nervae erigentes, very deep in the pelvis, followed by section of the hypogastric nerves on each side, as far as possible, where they join the hypogastric plexus. This operation was conceived by Richer of Lyons. I have worked out a practical technic for it.

TECHNIC

Under general anesthesia, the patient being placed in Trendelenburg position, an extensive suprapubic incision is performed to permit search for the nervae erigentes through an extraperitoneal access. With the help of a very large special valve, which is indispensable, a long clamp holding a pad of gauze divides the cellular tissue while long scissors cut fibers here and there. The deepest portion of the pelvis is reached quickly and rather easily, with no bleeding. The nervae erigentes, coming from the anterior branches of the second, third and fourth sacral nerves, form a thick bunch nearly 1 cm. wide, which lies against the pelvic wall, hidden by a sheet of fibrous tissue. This tissue is separated and the nerves are located. Long curved scissors are pushed behind them, and the nerves are cut between two ligatures with a flaxen thread. To prevent any bleeding, a temporary and slight packing is left in. The operation is then repeated on the opposite side. This is the difficult and most important part of the operation.

For the attack on the presacral nerve, which must be cut as well as the hypogastric nerves, the peritoneum must be opened. The intestines are pushed back, and the posterior layer of the peritoneum over the promontory is incised. The presacral nerve is then isolated. The two hypogastric nerves are clearly visible and are followed down as far as possible, to be cut between two ligatures where they join the hypogastric plexus. The presacral nerve is also cut. The peritoneum is closed. The packing in the region of the nervae erigentes is removed on each side. Sulfonamides and penicillin are injected locally, a drain is placed deeply in each side and the abdominal wound is sutured.

The operation is harmless, usually lasts less than one hour and gives the patient the best *chance for relief.* Successful results have

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** Professor of Urology, Faculty of Medicine, University of Bordeaux been obtained in 70 per cent of cases. These results have often been striking; my oldest patient, operated on 10 years ago, has remained in excellent health. Unfortunately, some patients will not consent to the operation, or their condition is so poor that they are not acceptable as operative risks. These are the reasons for which we have attempted relief of suffering by injection of cocaine solution in the region of the nervae erigentes in order to block these nerves. The following is the technic which I have developed for such anesthetic infiltration.

TECHNIC

The patient is placed in the genupectoral position. The apex of the coccyx and the sacral tubercle on one side are easily located. These two points are joined, and a rectangular line is drawn from the sacral tubercle; at 4 cm. on this line the point is located at which the trocar is inserted to search for the sacral edge in the direction of the fifth lumbar apophysis. The trocar should graze that sacral edge slightly, then cross the sacrosciatic ligament and penetrate 1½ cm. deeper. The crossing of the sacrosciatic ligament is clearly felt. The needle is then exactly in the center of the nervae erigentes; 20 cc. of cocaine solution are injected in two slightly different directions of the troçar. The same procedure is repeated on the other side.

Application of the method is followed by abatement of tenesmus and pain, sometimes so vividly that the patient will ask for another injection when the pain reappears. In cases where there is no hope of ever performing a denervation of the bladder, 20 cc. of alcohol at 95 F. with cocaine can be used instead of cocaine alone; marked and lasting relief has been obtained. In several cases of denervation of the bladder with insufficient results, complete success was attained by complementary infiltration of alcohol.

These two methods, infiltration of the nervae erigentes and denervation of the bladder, are two potent weapons against the fearful pain of inveterate cystitis. There is further always the possibility of performing cutaneous ureterostomy or implantation of the ureters into the sigmoid, if conditions should become extreme.

SUMMARY

Two methods are described for relief of exhausted patients with inveterate cystitis, aside from the well known cutaneous ureterostomy and implantation of the ureters into the sigmoid. The first is infiltration of the nervae erigentes with a cocaine solution. The second, designed for permanent relief, is denervation of the bladder. The author has developed an extraperitoneal approach for denervation of the bladder. The operation consists of the bilateral section of the nervae erigentes deep in the pelvis and of the hypogastric nerves through a narrow opening in the peritoneal cavity. The operation is harmless and successful, and lasting results have been obtained in 70 per cent of cases. It can also be applied for relief of the tremendous pain of chronic ulcers of the bladder and of inoperable forms of tumors of the bladder.

SOMMAIRE

Deux méthodes son décrites pour le soulagement des malades épuisés par une cystite invétérée. L'auteur ne discute pas l'urétérostomie cutanée ni l'implantation des urétères dans l'anse sigmoïde. La première méthode est l'infiltration des nerfs érigents avec une solution de cocaine. La séconde méthode qui donne, un soulagement permanent, est la dénervation de la vessie. L'operation consiste de la section bilatérale des nerfs erigents, dans le bassin, et des nerfs hypogastriques au moyen d'une légère ouverture du péritoine. L'auteur décrit d'excellents résultats, et a donné un soulagement permanent dans 70% des operés. Le traitement est indiqué pour le soulagement des grandes douleurs occasionnées par les ulcères chroniques de la vessie et aussi par les tumeurs inopérables de vessie urinaire.

SOMMARIO

Oltre l'ureterostomia cutanea e l'impianto degli ureteri nel sigma due metodi vengono descritti per alleviare i dolori nei pazienti esauriti da una cistite cronica. Il primo metodo consiste nel'infiltrazione dei nervi erettori con una soluzione di cocaina. Il secondo metodo, a carattere permanente, consiste invece nella denervazione della vescica ottenuta attraverso la recisione pelvica bilaterale dei nervi erettori e dei nervi ipogastrici. L'operazione, eseguita attraverso una piccola incisione extraperitonale, offre risultati permanenti nel 70% dei casi. Trova un'indicaziona palliativa anche nelle ulceri croniche e nei tumori nella vescica.

SUMARIO

El autor describe dos metodos para el alivio de la cistitis inveterada. El primero consiste en la infiltracion de los nervios erigentes con una solucion de cocaina. El segundo ofrece alivio permanente y consiste en la denervacion de la vejiga urinaria. El autor ha desarrollado una ruta extraperitoneal para la denervacion de la vejiga. Esta operacion consiste en la seccion bilateral de los nervios erigentes y de los nervios hipogastricos. Los resultados han sido excelentes en un 70% de los casos.

El autor recomienda este metodo tambien en las ulceras cronicas dolorosas de la vejiga y en los tumores inoperables de este organo.

PES TORTUS CONGENITALIS

(Continued from page 40)

shoes are applied and maintained until the child is three or four years old.

In the past the treatment of clubfoot (might I suggest pes tortus congenitalis) has undergone many changes. In the future it may undergo others, but what has long been one of the most arduous and unsatisfactory branches of orthopedic surgery has in the past few years become both simple and gratifying.

Our experience indicates that in uncomplicated cases of clubfoot we should be able to obtain normal feet and normal legs in both structure and function, if the child is seen during the first few weeks of life. By uncomplicated I mean no additional pathologic conditions, such as arthrogryphosis, spina bifida or cerebral spasticity. The degree of severity does not matter. A sharp line must be drawn between uncomplicated cases and those *in which the pressure has been of a degree to* injure muscles and stiffen joints. Nothing will restore muscle that has been destroyed, and it is impossible to get free movement in a joint where the peri-articular tissues were infiltrated before birth. Such cases can be improved, but nothing approaching a normal limb can be produced.

Denis Browne has made a great contribution. After becoming familiar with his principles and practice, the technic is so simple and obvious one wonders "why didn't I think of that myself years ago!"

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Liver Changes in Surgical Conditions of the Gastro-Intestinal Tract*

LEIF EFSKIND, M.D.**
OSLO, NORWAY

IT has long been generally recognized that the liver is of the greatest importance for the postoperative symptom complex. The investigations carried out in recent years concerning the behavior of the serum proteins in patients with various surgical diseases and the many experimental investigations concerning the significance of the liver as producer of, and storage point for, easily mobilizeable protein, have given these problems a new actuality.

The clinical and pathophysiologic tests for control of liver function are in so far uncertain and inexact, that minor pathologic changes cannot be recorded. I have consequently examined the anatomic condition of the liver in surgical patients and compared these findings with the pathophysiologic ones. The material consists of 150 cases with basic lesions. An effort was made to control the hematologic status including sodium chloride concentration before the operation. Liver biopsies were performed at intervals varying from 2 to 3½ hours according to duration of operation. In the cases presenting the most pronounced histologic changes it was of interest to control the findings during the further course, as an eventual reversibility must be taken into consideration. Liver puncture biopsies have consequently been taken in 40 cases one to six weeks after operation. All patients were operated upon under spinal anesthesia. The content of fat and glycogen in the cells as well as the mitochondria were examined. In this connection I shall only mention that the latter plays an important role in intracellular metabolism.

The histologic findings conformed so closely with the hematologic ones, that it has been feasible to use the latter partly as a basis for a division of the material into three groups:

I. Patients who presented normal hematologic conditions without preoperative treatment.
II. Patients who showed symptoms of chronic hypoproteinemia, often also anemia.
III. Patients with diseases of the liver or bile ducts.

A survey of the material reveals that less pronounced changes are demonstrated in patients belonging to Group 1. I shall not enter into histologic details. Preoperatively there is an ample, diffuse store (deposit) of glycogen. No fatty infiltration can be demonstrated. The mitochondria show a normal picture with the normal excess of the round forms. The liver tissue also shows a normal histologic picture. Postoperative findings depend upon extent and duration of operation performed. After major operations reduction of the glycogen and the number of mitochondria may be found. It must also be noted that the contours of the mitochondria are not so distinct as is normally the case. An inconstant finding is small fatty vacuoles centrolobularly. No further important general hepatic changes are observed.

In patients belonging to Group 2, the preoperative store of glycogen is normal or somewhat reduced, depending to some extent upon whether the preoperative treatment was adequate. A characteristic feature is a considerable fall in the content of glycogen during operation. The mobilization of the glycogen is most frequently limited to the region of the central vein. The central vein may be surrounded by a glycogen-free area, which is sharply distinguished from a region well supplied with glycogen. Fatty vacuoles are not infrequently observed in the cells, especially when a considerable and protracted anemia has been present simultaneously. This fatty infiltration increases distinctly after major surgical procedures. The number and the morphology of the mitochondria are changed. There is in addition an increase of rod-shaped mitochondria and appearance of monstrous forms, all presenting abnormal tinctorial reactions. Circulatory disturbances with dilatation of the liver sinusoids are demonstrated.

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** Associate Professor in Surgery, Oslo University Hospital.

Group 3 shows not infrequently preoperatively a quite amazingly good glycogen content. This also may be the case in patients with chronic jaundice, when the accumulation of bile pigment in the hepatic cells is moderate. An antagonism of volumetric nature is, however, present; hepatic cells which are stuffed with bile pigment contain very little glycogen; when the pigment deposits are less pronounced the glycogen is pressed out of a segment of the cell and the bile pigment occupies the remaining space. Pre- and postoperatively the fatty infiltration is greater in this group that in those mentioned above. The same seems to apply to the relationship between fat and glycogen as well as to glycogen and bile pigment. Thus the intact part of the cytoplasm outside the fatty vacuoles may frequently be seen tightly stuffed with glycogen. Liver cells, containing fat around the central vein, in the periphery contain a belt of glycogen granules. The glycogen in these cells appears to be little mobilizeable as compared with the non-fatty liver cells. These fat infiltrated cells are often arranged as islands rich in glycogen in a liver which does not otherwise contain any glycogen. This correlation indicates that a kind of blockade of the glycogen in these cells is present. This blockade may also be seen in parts of the liver showing signs of great circulatory disturbances. In a localized area of glycogen, containing cells around an endophlebitic central vein, the glycogen is further vacuolized and shows no normal granulation. Experimentally I have been able to demonstrate a quite similar picture in animals which were given injections of thyroxin in toxic doses. This blockade is not due to a reduced permeability of these cells, as injections of vital dyes in these animals cause a stuffing of the liver cells with dye Fatty infiltration is frequently found in the liver cells in this group, especially in the cases in which a simultaneous infection was present in the bile ducts with a chronic jaundice. This deposition of fat seems to be a reversible process. In one case a man was operated on for a concrement and infection in the common bile duct. Six weeks later a liver biopsy showed a normal histologic picture apart from a moderate deposit of bile pigment in the cells.

Another characteristic feature in this group is the change occurring frequently in the interstitial tissue with considerable fibrosis and ample infiltration of lymphocytes and plasma cells in the interlobular connective tissue. This inflammation seems to be without strict relation to the bile duct system, because no considerable sign of cholangitis could be demonstrated in any case.

Summarizing these investigations. I conclude that pathologic hepatic changes of regressive nature are demonstrable in a great number of patients with serious lesions in the digestive tract. These changes are accentuated to a considerable degree by major surgical procedures.

Concerning the etiologic factors of these hepatic changes, the classification alone demonstrates how dependent on the preoperative condition these changes are. If the material is studied it becomes evident that, with the exception of local hepatic lesions, chronic gastro-intestinal diseases, especially malignant tumors, produce the most pronounced changes; i.e., patients who have protracted nutritional deficiency and show hematologic signs of chronic hypoproteinemia. The hepatic findings are distinctly secondary to these, and a certain time seems to be necessary for the development.

These changes may often appear to be of a moderate degree, and under normal circumstances no clinical problem arises because of them. If, however, these patients are subjected to an increased strain on the hepatic function, as a major operative procedure, there develop histologic reactions in the hepatic cells which must be considered pathologic, particularly in the carbohydrate and fat metabolism. The extent of these seems to run parallel to a certain degree to the preoperative changes and to the extent of operative trauma. The hematologic reaction presented by these patients in the form of a remarkable reduction of serum proteins and a distinctly protracted stage of regeneration of these, indicates a fall in the production, in other words an affection also of the protein metabolism of the organ. This latter function seems to take place in intimate connection with the fat and carbohydrate metabolism, because patients who preoperatively had a small store of glycogen and ample fatty deposits demonstrate the most marked postoperative hematologic changes and the longest regenerative phase. It is not necessary here to discuss further the fact that the postoperative changes may increase to such a degree that they may cause therapeutic problems, because it is evident how difficult it may be to control the hypoproteinemia and its complications in some cases. On the other hand, I have also previously mentioned that these changes are most pronounced in those patients who demonstrate the greatest hematologic changes preoperatively without having these corrected. These falls show the importance of preoperative prophylaxis.

The pronounced pathologic changes which have been demonstrated in some patients with surgical liver and bile duct lesions may have a different etiology. The history of these patients often shows no nutritional deficiency, and the hematologic relations in the serum proteins frequently show moderate changes. Mild bile duct lesions are frequently present, yet the findings may be surprisingly great in relation to the basic lesion. The etiology in the non-jaundiced patients is probably a toxic infectious action by a lymphogenous route directly from the inflammatory focus. The hepatitic changes with lympho-plasmocytic reaction and even fibrosis also speak in favor of this conception.

Previously it has been stressed, chiefly on the basis of animal experiments, that the glycogen content in the liver is greatly reduced in chronic obstructive jaundice. When patients in this group have received adequate preliminary treatment, it is often remarkable to see how great their store of glycogen may be. It might be an indication that the assimilation phase in this aspect of liver function is comparatively little affected. On the other hand, the dissimilation phase is distinctly changed either in the form of increased mobilization of the glycogen or by the demonstrated retention which I have designated as intracellular blockade. Of course there is no guaranty that the glycogen present in these pathologic livers have the same structural formula and biochemical qualities as ordinary glycogen. Further investigations concerning the tinctorial reactions and the changes in structural formula that can be produced on alimentary basis apparently speak in favor of this.

I have not been able to trace any histologic reaction of the liver to an operative trauma in patients with protracted hypoproteinemia in the literature. Animal experiments by Whipple and Ravdin have demonstrated that a liver which contains only little easily mobilizeable protein is abnormally sensitive to toxic substances. These authors also state that a fatty infiltration of the liver cells will increase this effect. Glycogen determinations have not been carried out by the authors who ascribe a protective effect to the glycogen. This point of view is merely the same as that represented in this material. It is possible, however, to give another explanation of the protective effect of glycogen and the sensitizing action of the fat, that reduces the importance of these factors to be only of secondary nature. As mentioned before, this material has shown no principal antagonism between fat and glycogen in the liver cells. It is reasonable, however, to consider a liver rich in fat and poor in glycogen as an expression of a liver with reduced functional reserve on toxic or nutritional base, in which the described changes only are secondary.

Finally, the important question from a practical clinical point of view, whether such hepatic changes may be diagnosed and possibly treated preoperatively, presents itself. Based on our present tests of the liver function it is often hardly feasible by means of pathophysiologic methods. Certain clinical hints are however available, as patients with chronic hypoproteinemia often will present such changes as well as patients with liver-bile duct lesions.

Pyogenic Infection of Minor Abrasions in Tropical Areas—Their Treatment with Penicillin

THOMAS F. ROSE, M.B., B.S. (SIDNEY), F.R.C.S. (ENGLAND), F.R.C.S. (EDINBURGH),
F.R.A.C.S., M.R.C.O.G., A.I.C.S.[*]
SYDNEY, AUSTRALIA

ANY skin abrasion or insect bite sustained in tropical jungles is prone to become infected by streptococci or staphylococci. Once established in the skin lesion, these cocci quickly invade the surrounding tissues, regional lymphatics and even the blood stream.

The material for this report is furnished by 150 patients who were admitted to a field hospital over a short period of time, suffering from abrasions or insect bites infected by the pyogenic cocci.

These infections are summarized in the table where it may be seen that 65 were due to a penicillin-sensitive hemolytic streptococcus, 84 to a penicillin-sensitive hemolytic Staphylococcus aureus, and 1 to a penicillin-resistant hemolytic Staphylococcus aureus.

A. INFECTIONS DUE TO A PENICILLIN-SENSITIVE HEMOLYTIC STREPTOCOCCUS		
(a) Invasion of local tissues only	32	
(b) Invasion of local tissues and regional lymphatics	32	
(c) Invasion of the blood stream	1	
		65
B. INFECTIONS DUE TO A PENICILLIN-SENSITIVE HEMOLYTIC STAPHYLOCOCCUS AUREUS		
(a) Invasion of local tissues only	60	
(b) Invasion of local tissues and regional lymphatics	15	
(c) Invasion of the blood stream	9	
		84
C. INFECTION DUE TO A PENICILLIN-RESISTANT HEMOLYTIC STAPHYLOCOCCUS AUREUS		
Invasion of the blood stream	1	
		1
Total		150

INFECTION DUE TO PENICILLIN-SENSITIVE STREPTOCOCCI

Invasion of Local Tissues Only.—Local invasion by a penicillin-sensitive Streptococcus hemolyticus resulted in varying lesions, singly or combined. In 12 cases, tissue necrosis predominated in the clinical picture, and the abrasion became a rapidly spreading acute shallow ulcer, which, if left untreated, eventually became a deep chronic ulcer, with much tissue destruction, forming one type of "tropical ulcer." Seven other cases had reached this last stage when first seen. In other cases, the tissue response predominated and spreading erysipelas, cellulitis or abscess formation occurred. Three forearm infections were complicated by thrombophlebitis of the whole length of the adjoining basilic vein. Three infections in the region of the elbow were complicated by acute olecranon bursitis, and two near the knee joint by acute prepatellar bursitis.

Treatment consisted of intramuscular injections of 15,000 units of penicillin every three hours until the infection subsided. Heat was applied locally and abscesses were incised.

These cases required an average of 250,000 units of penicillin, and the inflammatory process was healed in an average of 3.5 days. The results in those lesions complicated by bursitis were satisfactory, the inflammation subsiding in a few days without proceeding to suppuration, as often occurred prior to the advent of penicillin. This avoided the necessity of open drainage of the bursa, a procedure often complicated by prolonged healing of the wound. When superficial thrombophlebitis occurred, the pain, tenderness and redness along the course of the vein rapidly disappeared, though the vein could always be felt as a thick cord for some weeks afterwards. Acute ulceration of the abrasions was rapidly checked by parenteral penicillin, and epithelialization quickly followed. If the ulcers were already chronic when first seen, parenteral penicillin eradicated the cocci from the surrounding tissues, but it was necessary to apply penicillin locally in a watery solution of 500 units per cc. to destroy the surface cocci, and so allow epithelialization to occur (at times aided by skin grafts). This was the only type of case in this series where penicillin was used locally.

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[*] Lately Major A.A.M.C.; Honorary Assistant Surgeon, Royal South Sydney Hospital; Clinical Assistant in Surgery, Sydney Hospital.

Invasion of Local Tissues and Regional Lymphatics.—Those infections complicated by regional lymphangitis and lymphadenitis were similar to those already described. They responded similarly to penicillin, healing in an average of four days and requiring an average of 30,000 units of penicillin.

Blood Stream Invasion.—There was only one case of streptococcal infection in which the blood stream was invaded.

CASE HISTORY

Case 1.—A soldier, 35, sustained an abrasion of his left leg. A large ulcer rapidly developed, complicated by a thrombophlebitis of the great saphenous vein. Treatment, begun eight days after injury, was by oral sulfanilamide, 32 Gm. in four days. The infection subsided, and the ulceration healed in 14 days.

One month after his injury he became very ill and developed a swinging temperature (99–104 F.) with rigors and sweats. Apart from the healed ulcer and thickened saphenous vein, there were no significant clinical findings. A blood count revealed 2,500,000 red cells per cc. with 40 per cent hemoglobin and 17,500 white cells per cc. with 80 per cent neutrophils. A penicillin-sensitive Streptococcus hemolyticus was isolated on blood culture. In the next three days, 24 Gm. of oral sulfanilamide and blood transfusions were given, but he became worse. Penicillin therapy was now begun; within two days his general condition had improved and he felt much better. His temperature subsided rapidly for three days and then more gradually, until at the end of a week it remained normal. A blood culture now was negative. Penicillin was stopped on the twelfth day, a total of 1,500,000 units having been given.

Six months later, a followup disclosed that he was well and had had no recurrence of symptoms.

INFECTION DUE TO PENICILLIN-SENSITIVE STAPHYLOCOCCI

Invasion of Local Tissues.—Local tissue invasion by penicillin-sensitive hemolytic Staphylococcus aureus resulted in cellulitis, abscess or tissue necrosis, the latter being typified by the carbuncle. (This may be compared with the streptococcal tissue necrosis which was characterized by ulceration.) When these lesions occurred near the superficial veins, local thrombophlebitis sometimes developed.

Treatment was the same as for the local streptococcal infections; the average amount of penicillin required was 275,000 units, the lesions healing in an average of 5.5 days. The rapid effect of penicillin was especially marked in patients with carbuncles, of which there were 23, 6 involving the dangerous area of the face and upper lip. Penicillin caused them all literally to "melt away"[1] without surgical intervention in the acute phase, so that they subsided in an average of 4.5 days with 260,000 units of penicillin. The sloughs also had usually separated by then. Here, however, though the inflammatory process was so rapidly checked and cured by penicillin, the tissue loss due to necrosis still had to be replaced by the normal process of healing, epithelialization of extensive areas at times being hastened by split skin grafts.

Invasion of Local Tissues and Regional Lymphatics.—The local staphylococcal infections complicated by regional lymphangitis and lymphadenitis were the same as described, except that in no instance was lymphatic involvement due to carbuncle. They were treated in the same way, healing in an average of 4 days and requiring an average of 230,000 units of penicillin. They healed a little more quickly than those not complicated by lymphatic involvement because the local pathologic state was usually less severe.

Blood Stream Invasion.—Cases of staphylococcemia could be divided into three groups.

1. A mild single "spill-over" type, where the cocci apparently invaded the blood stream only once and formed a metastatic abscess (five cases, Cases 2–6).

2. A mild type in which there were repeated invasions of the blood stream at fairly prolonged intervals (Case 7).

3. A severe type in which the cocci almost continuously invaded the blood stream (three cases, 8–10).

1 Mild Single "Spill-Over" Type.—The five patients in this category had minor infected insect bites which healed without any active treatment. At varying periods of time ranging from three to eight weeks, each developed a single metastatic abscess from which a penicillin-sensitive hemolytic Staphylococcus aureus could be cultured. Cases 2 and 3 developed abscesses in the lumbar portion of the sacrospinal muscle. Case 4 developed a large left perinephric abscess with no apparent involvement of the kidney. Cases 5 and 6 each developed a carbuncle confined to the upper pole of the right and left kidneys, respectively. Treatment was similar in all instances. Penicillin therapy (15,000 units intramuscularly every three hours) was begun as soon as the true condition was suspected. The abscess was then incised and evacuated when it became localized. The renal carbuncles were scooped out of the kidneys, which otherwise were not touched. Penicillin was then continued until it was certain that the active inflammatory process had subsided, each patient having had an average of 1,200,000 units of penicillin by the time this stage was reached.

When examined some six months later, none had had recurrence of symptoms. Those who had renal carbuncles showed kidneys normal both anatomically and functionally by intravenous pyelography.

2. Mild Recurrent Type.—The history of this case of recurrent metastatic abscesses and femoral periostitis is given.

Case 7.—A soldier, 26, had a history of multiple minor infected abrasions of the legs and arms, all of which yielded to local treatment. Three weeks later he became ill with headaches, weakness and fever (99–102 F.). Fourteen days later, several tender infiltrated swellings appeared in the extensor muscles of the right forearm and left thigh. A blood culture was negative, but there was a leukocytosis of 17,500 white cells with 80 per cent neutrophils. Again, 14 days later, a large abscess appeared in the right quadriceps muscle. It was incised and a hemolytic Staphylococcus aureus (later shown to be penicillin sensitive) was cultured from the pus. Simultaneously, the swellings in the forearm and left thigh gradually disappeared. However, a week later, pain, tenderness and swelling recurred in the left thigh. A roentgenogram showed a slight periostitis of the femoral shaft just above the lateral condyle. Associated with this was an effusion into the knee joint (the fluid was sterile on culture). During this time, his temperature ranged from 98.4–100 F., and he felt weak and tired and lost weight despite repeated courses of sulfonamide compounds. Repeated blood cultures were always negative.

Five weeks after his illness began, penicillin was obtained and treatment was instituted. He immediately showed marked general improvement; pain and tenderness in the thigh disappeared, though the x-ray picture did not change. The sympathetic joint effusion resolved. His temperature became normal in seven days, and penicillin therapy was stopped five days later, a total of 1,500,000 units having been given.

This patient could be followed only for four months, during which time he remained in good health.

3. Severe Continuous Type of Blood Stream Invasion.—Three cases of this type are presented.

Case 8.—Renal carbuncle with lung involvement occurred in a soldier, 25. He had a small staphylococcal abscess of his right arm following a mite bite. This healed rapidly after incision, but he then developed irregular temperature (99–102 F.), gradually becoming very ill, wasted and anemic. Six weeks after his illness began a large carbuncle was found in the upper pole of the right kidney. This had burst into the perinephric tissues and into the upper major calyx, causing a staphylococcal pyuria. The perinephric abscess was drained and the carbuncle scooped out of the kidney. From the pus and the urine a hemolytic Staphylococcus aureus was isolated, and later shown to be penicillin sensitive. A blood culture also showed the presence of a similar coccus. His general condition was treated by frequent blood transfusions.

After an improvement lasting two days only, he had a rigor and his temperature rose to 104 F. In spite of oral administration of 24 Gm. of sulfathiazole in the next three days, blood culture again showed a penicillin-sensitive Staphylococcus aureus.

Penicillin now became available, and therapy was instituted. The result was dramatic. In three days he looked and felt better. His temperature fell to normal in nine days. The urine became normal in 10 days, and the loin wound, through which urine had escaped for a week, healed in 20 days. The course of penicillin lasted 16 days, 2,000,000 units being given. Three days after cessation of penicillin therapy, his temperature again rose to 104 F., and he developed a severe pleural pain in the right side of his chest, where the lower lobe of the lung was found to be consolidated. A blood culture was again positive for staphylococci, which were also isolated from the sputum. A further course of 1,500,000 units of penicillin was given in the next 12 days. Again his condition rapidly cleared up, the temperature becoming normal in five days. An effusion appeared in the right pleural cavity but did not recur after 450 cc. of clear sterile fluid were aspirated. His lung consolidation rapidly resolved, and two weeks after appearance the lung fields were normal. From then on his convalescence was uneventful, and nine months later he was well. An intravenous pyelogram at that time revealed a normally functioning right kidney with a normal pelvicalyceal system. The lung fields were also normal.

Case 9.—This was one of multiple metastatic muscle abscesses. A soldier, 20, had an infected abrasion of his left leg which healed rapidly under local treatment. A week later he became ill with elevated temperature and general malaise. Five days later, despite oral administration of 35 Gm. of sulfathiazole, abscesses appeared in the extensor muscles of the right forearm and left thigh. These were incised and a penicillin-sensitive Staphylococcus aureus was cultured from the pus of each abscess. However, his condition became worse, temperature rose and fresh abscesses developed in the right forearm. Blood culture now revealed a staphylococcus similar to that in the abscesses.

Penicillin treatment was instituted, and 1,500,000 units were given in the next 12 days. Temperature became normal in five days, and blood culture was now sterile. His general condition improved rapidly, and the abscesses healed quickly. Some six months later, he was well with no recurrence of symptoms.

Case 10.—Multiple metastatic muscle abscesses, pyelonephritis and lung infection developed in this case. A New Guinea native, 30, had a history of multiple infected skin abrasions. After a week's illness with general malaise, rigors and sweats, a large staphylococcal abscess appeared in his right sacrospinal muscle. This was incised, but, in spite of oral sulfathiazole (8 Gm. per day), he developed a similar abscess in the right rectus abdominis muscle three days later. This too was incised, but without relief of his general condition; four days later, consolidation of the lower lobes of both lungs was found. He coughed up much purulent sputum, from which staphylococci were isolated. Urinalysis now disclosed albumin, pus and casts in the urine, from which staphylococci were cultured. He had now had 35 Gm. of sulfathiazole, but his general condition was becoming worse. Blood culture was now, on the fourteenth day of illness, positive for a penicillin-sensitive Staphylococcus aureus.

Penicillin therapy was begun. His condition improved immediately, and temperature became normal in eight days. Urinalysis showed a clear sterile urine in 12 days, by which time his chest condition had completely resolved. A total of 2,000,000 units of penicillin was given in 16 days.

A follow-up disclosed that he remained well for three months, but then developed a similar illness from which he died in a few days. He was then in a remote district where medical attention was unavailable.

BLOOD STREAM INVASION DUE TO A PENICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS

Only one patient in this series became infected by a penicillin-resistant staphylococcus; he developed a fatal blood stream infection.

Case 11.—Overwhelming infection with metastatic muscle abscesses, lung infection and death were observed in this patient, a Solomon Island native with a previous history of numerous infected minor skin abrasions. He had been ill for one week with rigors and sweats, when he developed a pneumonic consolidation of the lower lobes of both lungs and multiple abscesses in the muscles of both thighs and arms. A white cell count showed 45,000 leukocytes per cc., but no organisms could be grown from the blood stream.

Penicillin therapy was instituted, but he never rallied and died three days later, 36,000 units of penicillin having been given. Autopsy disclosed multiple abscesses scattered throughout both lung fields and the muscle system. A penicillin-resistant hemolytic Staphylococcus aureus was isolated from the abscesses in the muscles and lungs, but none from the blood stream. His cardiovascular system was normal and there were no vegetations on the heart valves.

DISCUSSION

Of 150 infections described, 65 were due to Streptococcus hemolyticus, and 85 to hemolytic Staphylococcus aureus; in every instance, except one, the cocci were penicillin-sensitive. In the streptococcal infections there were 32 local tissue invasions, 32 with additional invasion of the regional lymphatics and 1 with invasion of the blood stream. In the staphylococcal infections there were 60 with local tissue invasion only and only 15 with additional lymphatic involvement. However, there were 10 cases of blood stream invasion. In this series, therefore, it seems that when the organism began to spread from the local tissues, the streptococci favored the lymphatic system, whereas the staphylococci favored the blood stream.

Penicillin was given intramuscularly in every case of the series, the amount being 15,000 units every three hours; this dosage was shown by Fleming[5] to be the optimum. (Lately, however, I have been giving penicillin hypodermically in doses of 100,000 units in 1 ml. of saline every 8 hours, and have secured the same clinical results. This method is less exhausting and painful to the patient.) In the instances of local tissue invasion (with or without invasion of the lymphatics), penicillin therapy was stopped as soon as the local signs subsided. It was more difficult to decide when to end the administration of penicillin in the blood stream infections. Here general condition and temperature were the chief guides. When temperature subsided, treatment was continued for one week (though even this was not always sufficient, as in Case 8).

Anderson[1] points out that in severe blood stream infections striking improvements may not be shown in the first few days of penicillin therapy, but the patient feels better, even though his temperature is high and his blood culture is positive. This was well seen in Cases 1, 8 and 9. Cases 1, 7, 8, 9 and 10 show the good effect of penicillin after failure of the sulfonamides, a similar observation to that made by numerous other authors. This is hardly surprising, as before the introduction of penicillin the mortality rate of staphylococcal blood stream infections was nearly 80 per cent, whereas now it is said to be 20 per cent. When treated by *sulfonamides*, it varied from 70–85 per cent.[7] Consequently, where a staphylococcal or streptococcal blood stream infection is suspected, penicillin should be given immediately and not delayed until the effect of the sulfonamide therapy is seen.

In comparing mortality rates prior to, and after the introduction of penicillin, Butler[3] points out that this can only be done accurately when quantitative blood cultures are performed in each case. He states that a staphylococcal septicemia is not always fatal, even if untreated, but the fatality rate rises rapidly when culture grows 100 or more colonies per cc. of blood. Only by doing a series in such a way will one be able correctly to estimate the effect of penicillin. Unfortunately, this was not done in this series, but the cases are graded by clinical severity, and probably represent a fairly accurate picture of the therapeutic effect of penicillin in blood infections.

Thus, though penicillin has proved to be the most effective weapon yet discovered in treatment of staphylococcal blood stream infections, there are certain cases which do not require it for recovery, as well as others in which penicillin is absolutely necessary for recovery, and still others which it cannot cure. Example of all three types are represented in this short series. Cases 2–6 represent those with but a single "spill-over" of bacteria into the blood stream; these will recover when surgery without penicillin is used. Similar cases seen prior to the advent of penicillin ran exactly the same course, even the time of wound healing was similar. However, though penicillin appeared to be superfluous in treatment of such cases, nevertheless, one can never be sure at the time whether they will not develop as did Cases 8, 9 and 10, so that it should always be used.

Case 7 represents the type of infection which has repeated mild "spill-overs" of bacteria into the blood stream. This may, however, go on for a long time, so that death eventually ensues, unless penicillin treatment is instituted. The use of penicillin almost certainly saved this patient from further metastatic abscesses and cut short his illness. Cases 1, 8 and 9 represent the type of infection which benefits most from penicillin, namely, a continued severe blood stream infection. They would certainly have died in prepenicillin days. Case 10 is typical of the type in which penicillin may cure one bacteremic phase, but cannot prevent a recurrence, weeks or months afterwards. Had this patient been able to have more penicillin, he might not have died of the second attack, but even then there would have been no guarantee against still later, fatal recurrence.

Case 11 was an overwhelming infection by a penicillin-resistant Staphylococcus aureus, which responded to no treatment. Such examples as Case 10 and 11, and those in which the heart valves are the seat of vegetations, prevent penicillin from having a 100 per cent cure rate in these staphylococcal infections.

Thus, of the 11 blood stream infections reported here, four recovered only because of penicillin, one was improved temporarily with penicillin and one was resistant to penicillin. The course of illness of the remaining five was probably not affected by penicillin.

RENAL CARBUNCLE

Cases 5, 6 and 8 show the excellent results to be expected by renal conservation aided by parenteral penicillin in treatment of renal carbuncle.[15] even when, as in Case 8, the carbuncle ruptures into a calyx or the perinephric tissues. McAllister and O'Connor[12] tried the effect of penicillin before surgery in a case of renal carbuncle; the patient's general condition temporarily improved, but it did not prevent the carbuncle rupturing into the renal pelvis or the necessity for an eventual nephrectomy. This shows again that penicillin therapy must be accompanied by any necessary surgical drainage of abscesses.[6]

In Cases 8 and 10 the quick effect of penicillin in staphylococcal lung infections[1, 5] and in staphylococcal pyelonephritis is apparent.

PROPHYLAXIS OF BLOOD STREAM INFECTIONS

Little can be gathered from this series as to whether penicillin can prevent a blood stream invasion when local infection of these minor abrasions has occurred, save that in no instance in the 139 local infections, did a blood stream invasion occur in the six months following penicillin treatment. Again, none of the cases of blood stream infection had had their original lesions treated with penicillin, though some had had sulfonamide therapy. It may be noted, however, that penicillin did not prevent a fatal recurrent blood stream invasion in Case 10.

SUMMARY

A total of 150 cases of infected minor skin abrasions and insect bites sustained in the tropics is discussed. Sixty-five were infected by a penicillin-sensitive Streptococcus hemolyticus, 84 by a penicillin-sensitive Staphylococcus aureus and one by a penicillin-resistant Staphylococcus aureus. (Conditions were such that anaerobic culture of these lesions could not be done.)

Of the streptococcal infections, only one (1 in 65) invaded the blood stream, whereas there were 10 staphylococcemias (1 in 8.5). The streptococci showed a greater tendency to invade the lymphatics (32 in 54 cases) than the staphylococci (15 in 85 cases). All cases were treated by penicillin in addition to any necessary surgical intervention. There were two deaths in 11 cases of blood stream invasions, one due to a recurrent blood stream invasion by a penicillin-sensitive staphylococcus and one to a penicillin-resistant staphylococcus.

The cases of blood stream invasion are classified and described in detail to show the effect of penicillin in the various types.

RÉSUMÉ

L'auteur discute 150 cas de légères abrasions de la peau et de piqûres d'insectes observées dans les tropiques. Soixante-cinq des cas furent infectes par des streptocoques

hemolytiques sensitifs à la pénicilline, quatre-vingt quatre cas par des staphylocoques aureus sensitifs à la pénicilline (les conditions etaient telles que des cultures amébiques ne furent pas faites); des infections streptocoquales, une seule envahit le système sanguin (une dans 65 cas); des infections staphylocoqual, il y eut 10 infections sanguines (une dans 85 cas). Les streptocoques envahisent les lymphatiques dans 32 cas; les staphylocoques dans 15 cas. Toutes les infections furent traitées par la pénicilline, et quand c'était nécessaire par intervention chirurgicale. Il y eut 2 décès dans les onze cas d'invasion sanguine, un dans un cas d'invasion récurrente de staphylocoques sensitifs à la pénicilline et un dans un cas de staphylocoque résistant à la pénicilline. L'auteur classifie les cas d'invasion sanguine et décrit en detail les effets de la pénicilline dans les differents cas.

RIASSUNTO

L'autore discute 150 casi di lesioni cutanee superficiali e di morsicature di insetti nelle zone tropicali. 65 casi sono stati trovati infetti da streptococchi emolitici sensibili alla penicillina: 84 da stafilococchi aurei egualmente sensibili: 1 da una varietà di stafilococco aureo non sensibile (culture anaerobiche non poterono essere istituite).

Delle infezioni streptococciche, solamente una diede luogo ad une setticemia, mentre delle infezioni stafilococciche 10 si estesero ai vasi sanguigni. Gli streptococchi rivelarono una più frequente tendenza ad invadere i linfatici (32 volte sopra 54 casi) degli stafilococchi (15 volte sopra 85 casi). Tutti i casi vennero curati con la penicillina oltre ad ogni eventuale intervento operativo.

Due casi di morte seguirono ad 11 infezioni ematiche: un caso dovuto ad un'invasione ricorrente del sangue da parte di uno stafilococco sensibile alla penicillina: l'altro caso ad una stafilococco resistente alla penicillina.

I casi di setticemia sono stati classificati e descritti in dettaglio per dimostrare l'azione della penicillina nei diversi tipi.

SUMARIO

El autor discute 150 casos de infecciones benignas de la piel debidas a la abrasión por picadura de insectos en el tropico. En 149 de los casos la bacteria causante de la infección fue sensitiva a la penicilina, de los cuales 65 fueron debidos al streptococco hemolitico y 84 al estafilococo aureo. Solo un caso fue debido a un cultivo de estafilococo aureo resistente a la penicilina. (Fue imposible el hacer culturas anerobicas.)

De los 150 casos solo hubo un caso de estreptococcemia y 10 de estaphilococcemia. Las infecciones estreptococcicas presentaron mayor tendencia a invadir el tejido linfatico (32 en 54 casos) que las estafilococas (15 en 85). Todos los casos fueron tratados con la penicilina y por la intervención quirúrgica cuando este fue necesario. Solo dos casos terminaron fatalmente; el caso de estafilococcemia resistente a la penicilina y un caso tambien de estafilococcemia pero sensitivo a la penicilina.

Los casos de invasión sanguínea son clasificados y estudiados en detalle para mostrar el efecto terapeutico de la penicilina.

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Struma Lymphomatosa (Hashimoto's Disease)

Report of a Case*

EDWIN S. SINAIKO, M.D., A.I.C.S., CHARLES H. LAWRENCE, M.D.
AND
IRVING ZITMAN, M.D.
CHICAGO, ILLINOIS

SINCE the time of Riedel's reports[1, 2] and that of Hashimoto,[3] medical literature, though relatively sparsely studded with case reports, has evolved the specificity and laid down certain diagnostic criteria which are of invaluable aid in approaching the diagnosis of the more infrequent types of thyroid pathology.

J. A. Schilling,[4] in his excellent review, has shown the development of thought, based on the literature, to a point where, in the opinion of most writers, there are both clinical and pathologic factors which differentiate struma lymphomatosa or Hashimoto's disease from struma fibrosa or Riedel's struma. Struma lymphomatosa by reason of its clinicopathologic picture is regarded as an entity, but it is conceded that struma fibrosa may be a late stage of the acute thyroiditis described by De Quervain and Giordanengo.[4]

The case reported here fell into the category of struma lymphomatosa so typically, that it enabled us to venture the diagnosis preoperatively. It is of interest from that standpoint as well as the documenting of another case report of this uncommon condition.

CASE REPORT

White woman, 56, first consulted one of us (E.S.S.) on May 21, 1946. Her complaints were many and varied, but she sought medical care particularly because of paresthesias of two years' duration, described as numbness and tingling of the right hand, and of choking spells. In her occupation as a dining hall attendant she frequently dropped utensils. For the past two years she noted occasional choking spells while eating, as though food had become lodged in her throat. Coupled with this were frequent attacks of hoarseness. Other complaints were weakness of the right ankle which caused her to stumble occasionally, fatigue, lack of ambition, backache, aching pain in both shoulders and selective dyspepsia for fried and fatty foods.

She had been married twice, her first husband dying of tuberculosis; the second died following a herniorrhaphy. Otherwise, the family history was noncontributory. Her past medical and surgical history indicated an attack of jaundice in 1918. A supracervical hysterectomy had been done 30 years ago. She believes that her ovaries and tubes were also removed at this time because of tuberculosis. A tonsillectomy was done in 1920. After an x-ray examination two years ago, she was told that there were stones in the gallbladder. She admits to six induced abortions but no full-term pregnancy. Her maximum weight was 208 lb. 13 years ago. She smokes moderately and drinks occasionally.

Physical examination revealed an ambulatory, obese white woman of heavy features and a husky voice, weighing 177 lb. and appearing her age. The skin of the face seemed thickened, and there was prominence of the infra-orbital fat pads. The palpebral fissures were widened, and an appearance of "staring" was apparent. Her blood pressure was 130/60. Her pulse was 64 and regular, and oral temperature was 99.6 F. There was an obvious mass in the area of the thyroid gland which was diffusely hard and smooth, with definable borders. The upper pole on the right extended 1 cm. above the upper level of the thyroid cartilage, and the superior pole of the left lobe was at the level of the thyroid cartilage. The inferior margins disappeared beneath the sternum and medial portions of the clavicles on each side. There was no apparent infiltration or adhesions to the surrounding tissues of the neck. The lungs were clear, and there were no unusual cardiac findings. A well healed suprapubic midline abdominal scar was present, and there was moderate tenderness to deep palpation over the cecum and sigmoid colon. A fine tremor of both hands was present. The deep reflexes were diminished but equal; the superficial reflexes were nor-

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* From the Medical Service of Sidney A. Portis, Michael Reese Hospital, Chicago.

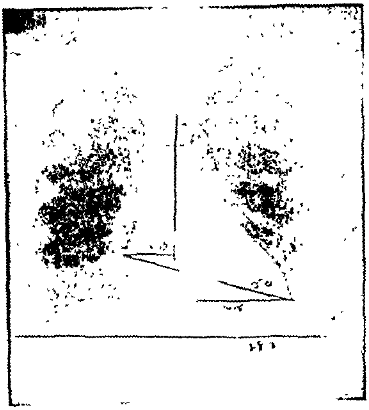

Fig. 1. Chest plate showing substernal extension with tracheal deviation.

mal. No areas of hyperesthesia, hypesthesia or anesthesia were found, and there were no pathologic reflexes.

Laboratory findings were as follows:

Blood: Erythrocytes 4,680,000, hemoglobin 92 per *cent, leukocytes 9,850 with a differential* distribution of 21 lymphocytes, 4 monocytes and 75 neutrophils. Serologic tests were negative.

The urine was normal, and the stool showed no occult blood. The gastric analysis showed histamine anacidity.

The basal metabolic rate was minus 9 per cent.

The intravenous glucose tolerance test showed the following:

Fasting blood sugar..	82 mgm. %
½ hour after 1/3 Gm. glucose I.V. per Kg. body weight	155
1 " " " " " " " " " "	129
1½ " " " " " " " " " "	93
2 " " " " " " " " " "	83

Blood cholesterol was 185, with 71 per cent esters.

The electrocardiogram was interpreted as abnormal because of low amplitude of all T waves and small R and deep S wave in CF_2, and diphasic T in CF_5. The rhythm was sinus bradycardia.

The roentgenogram (Fig. 1) revealed displacement of the trachea to the left with some compression, which was thought to be due to a tissue mass in the right superior thoracic strait. Two large calcified stones were seen in the gallbladder in the cholecystograms.

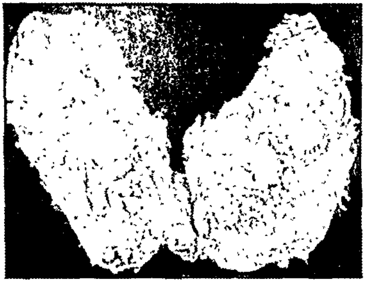

Fig. 2. Posterior surface of the thyroid gland showing indentations conforming to the areas of tracheal compression.

Struma lymphomatosa (Hashimoto) was considered as primary diagnosis, with the incidental findings of cholelithiasis and histamine achlorhydria.

Operation.—A thyroidectomy was performed on Sept. 30, 1946, under intratracheal cyclopropane anesthesia. The usual technic was followed. The gland was hard, enlarged and not adherent, except pretracheally, to the surrounding structures. The surface of the gland was finely cobblestoned in appearance (Fig. 2). The isthmus was compressed by the *enlarged right and left lobes. The gland* partially encircled the trachea and extended below the border of the sternum and the medial portions of the clavicles. Because of the larger right lobe, the trachea was shifted to the left side. The thyroid gland was removed in the usual manner, difficulties being met because of increased bleeding due to distention of the blood vessels on the surface of the gland. Other difficulties were caused by the excessive hardness, *friability and rigidity* of the gland. The usual hemostatic forceps were useless because they cut through the nonyielding parenchyma. Lahey thyroid forceps were used almost exclusively to control the bleeding and as a means of traction. Because of the extremely high position of the right superior pole, the superior thyroid artery was completely exposed to its union with the external carotid artery as a precaution against losing it. Another factor encountered, and one which is expected in struma lymphomatosa, was a marked adherence of the isthmus of the gland

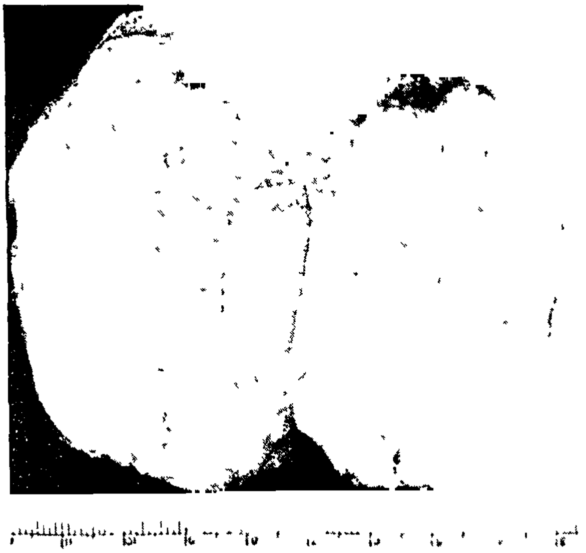

Fig. 3. Cut surface showing mosaic pattern or pseudolobulated appearance.

to the trachea. This was so extremely adherent that no plane of dissection could be found and rather than chance an injury to the trachea, a small remnant of the thyroid was left behind in this region. Because of the enlarged size of the right lobe and because of its mechanical effect upon the trachea and possibly the esophagus, this lobe was removed in toto without much difficulty, exposure and ligation of the inferior thyroid artery being done as a preliminary step. Exposure of the right recurrent laryngeal nerve to avoid its injury was also necessary. A portion of the left lobe, roughly 2 x 2½ x 2 cm., was left, together with the left parathyroid bodies. A parathyroid body removed from the right lobe was ultimately reimplanted in the right sternomastoid muscle. A Penrose drain leading to the thyroid bed was brought to the exterior. The severed ribbon muscles which were transected to allow better exposure were resutured, the muscles were closed in the midline and the skin was united with clips. Extubation was followed by evidence of a free airway, and inspection of the vocal chords by direct vision showed them to be normal.

The postoperative course was uneventful except for increasing myxedema which became evident before the patient left the hospital, necessitating the postoperative administration of dried thyroid extract, gr. 3 (.18 Gms.), daily by mouth.

The pathologic report by Dr. Otto Saphir was that of two pieces of thyroid tissue, together weighing 140 Gm. and measuring 8 and 8½ cm., respectively. The external surfaces were pinkish tan. The consistency was stony hard and finely nodular. The sectional surfaces were tannish grey and of mosaic appearance and contained occasional widely spaced grey-white dots. In the center of the specimen occasional calcific plaques were seen.

DISCUSSION

From a summary of the literature made by Schilling,[4] the following pertinent clinical data have been collected concerning struma lymphomatosa.

Age of occurrence in years is between 40 and 60. Sex incidence is almost 100 per cent female. Predominant symptoms are presence of a goiter with vague pressure symptoms. They are usually of years' duration with recent acceleration. In general, these patients have had a goiter for years with diffuse thyroid involvement. Should x-ray therapy of the gland be tried, an excellent response may be expected. This response to x-ray therapy is pathognomonic of the disease. The postoperative course is usually uneventful, but is followed by myxedema and related metabolic disorders.

In contrast to struma lymphomatosa, struma fibrosa or Riedel's struma usually occurs in the 20–40 age group and in the male, 20–40 per cent. Duration of the goiter is usually one to two years, and 30 per cent are unilateral. There is no response to x-ray therapy, and should the patient undergo surgery, the postoperative course is often stormy. A follow-up study ordinarily shows no myxedema and occasionally no relief of pressure symptoms; laryngospasm is common postoperatively.

Struma fibrosa, the giant cell variant, as described by DeQuervain, is essentially like struma fibrosa (Riedel's) clinically. It is believed to be a more acute form of the latter, eventually becoming a true struma fibrosa. The De Quervain giant cell variant of struma fibrosa differs clinically from the true struma fibrosa in that the postoperative course is usually uneventful, and there is a prompt remission of symptoms with no recurrence after surgery. It is exactly like struma fibrosa in its age and sex incidence and in its degree of thyroid involvement. Ordinarily the giant cell variant has a shorter antecedent history of goiter, that of 1–12 months.

The pathologic characteristics of struma lymphomatosa are tabulated from the litera-

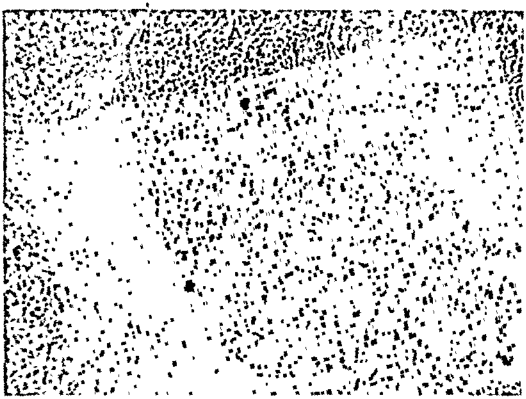

Fig. 4. M[illegible]cal appearance of [illegible]e.

ture by the same author,[illegible] who describes the gross surgical appearance of the gland as pseudolobulated with a yellow cast, with a variable bleeding tendency and adhesions pretracheally only. Extent of involvement of the gland in struma lymphomatosa is 100 per cent. It is a diffuse involvement, and the consistency is firm. Ordinarily there are no adenomas; colloid, if present at all, is very scanty. The stroma of the gland is of fine connective tissue, and there is only a slight to moderate increase of it (Fig 4). The cellular infiltration of the parenchyma is densely lymphocytic with formation of lymph follicles and germinal centers. The blood vessels are described as being uninvolved

The pathologic characteristics of struma fibrosa differ from that of struma lymphomatosa *in that the gross surgical appearance* of the former is white and smooth, with a decreased bleeding tendency, the gland is adherent always to contiguous structures by *very dense* and generalized adhesions. Instead of involving the thyroid completely, struma fibrosa in one third of the cases is unilateral, and the consistency of the involved area is bonelike Adenomas may occasionally be present In uninvolved areas, there is normal colloid The stroma shows marked fibrosis and hyalinization. The cellular infiltrate in struma fibrosa displays a moderate number of lymphocytes and leukocytes in fibrous planes. There is a change in the blood vessels: the intima and media are thickened.

The giant cell variant of struma fibrosa as described by De Quervain has essentially the same pathologic characteristics as Riedel's struma or struma fibrosa, except possibly that the degree of fibrosis is less with less hyalinization. The gland is not quite as hard and the cellular infiltrate, in addition to the leukocytes and lymphocytes, also contains plasma cells, histiocytes and many pseudo and true giant foreign body cells. The blood vessels show some periarterial fibrosis and occasional intimal thickening.

The importance of thyroiditis is primarily its differentiation from malignant disease. Of importance is that *carcinoma rarely occurs* in a previously normal gland. The sex incidence is not that of *Hashimoto's disease*; approximately one third of the cases reported *are in males*. The *carcinomatous gland is* not smooth when palpated preoperatively, but has a nodular surface, *and there is a frequent* invasion of adjacent tissues and also lymph nodes. *Struma lymphomatosa* involves the entire gland. Carcinoma follows more the pattern of *Riedel's struma, i.e.,* confined to a portion of one lobe or to one lobe.

In struma lymphomatosa the outline of the gland, although possibly generally enlarged or asymmetrically enlarged, is not distorted, and as Lahey[5] points out, the anatomic outline is retained as well as the sharp apex of the upper pole at the point where the superior thyroid vessels enter.

TREATMENT

Nothing is known of the etiology of Hashimoto's disease, therefore no measure of prevention can be taken. Faulty diet, metallic poisoning, virus and bacterial infections have all been considered but not proved, according to McCarrison's work and quoted by Lee *et al.*[4, 6] Unless definite symptoms of mechanical interference are present, Schilling[4] suggests x-ray therapy as the treatment of choice. However, in all events, a biopsy of the gland to rule out malignancy and to assure the diagnosis of Hashimoto's disease should be made before this course of treatment is prescribed. Should mechanical interference with swallowing, breathing or phonation exist, the treatment is surgical. In this, total thyroidectomy is not necessary; rather, it is contraindicated because (1) it is not necessary for relief of symptoms, (2) total thyroidectomy is unphysiologic since the patient is usually myxedematous, and (3) total thyroidectomy carries with it the risk of damage to the recurrent laryngeal nerve and the parathyroid glands. In our case, however, the entire right lobe was removed because of its deforming effect on the trachea and possibly the esophagus.

Complete resection of struma fibrosa is almost impossible technically, and is attendant upon possible irreparable damage to the parathyroid glands and the recurrent laryngeal nerves. Total thyroidectomy has its indication in malignancy of the thyroid gland and is not necessary in struma fibrosa.

SUMMARY

A case report of typical struma lymphomatosa is presented. It occurred in a woman, 56, who had in the preceding two years noted symptoms ascribable to hypothyroidism with local pressure symptoms, due to a diffusely enlarging thyroid gland which, though hard and unyielding, was freely movable in the neck and had definitely outlined borders. The gland was smooth.

From these pertinent facts and findings which coincided with summaries of clinical characteristics of Hashimoto's disease, it was possible to venture the preoperative diagnosis, ruling out struma fibrosa, carcinoma and the more common types of disease that involve the thyroid gland. At operation the diagnosis was confirmed by the surgical appearance of the gland and its almost pathognomonic tendency to adhere only pretracheally, being devoid of other adhesions. Extreme hardness and lack of pliability of the gland, its surface vascularity, pretracheal adhesions, high anatomic position of the right superior pole and substernal extension of the gland were the unusual features met with at its removal. Endotracheal administration of the anesthesia was used because of the deviated trachea. Early postoperative myxedema required 3 gr. of thyroid daily to maintain a normal clinical basal metabolic level.

RÉSUMÉ

Un cas typique de struma lymphomatose est presenté. La malade âgee de 56 ans, avait pendant les deux annés précédentes eu des symptômes d'hyperthyroïdisme associés avec compression locale due a l'hypertrophie de la glande thyroïde. Le glande thyroïde etait augmentée en volume et etait ferme et résistante. La glande etait mobile dans le cou, présentait des bords unis, et une surface unie.

Les symptômes coïncidaient avec les caractérestiques cliniques de la maladie de Hashimoto. Il fut possible d'avancer un diagnostic préopératoire et d'exclure le struma fibrosa, le carcinome, et les maladies les plus usuelles de la glande thyroïde. A l'opération, on confirma le diagnostic par l'apparence chirurgicale de la glande et sa tendance presque pathognomique d'adhérer soulement à la paroi antérieure prétrachéale. Il n'y avait eucune autre adhérence. L'extrême dureté et manque de pliabilité de la glande, la vascularite de sa surface, les adhésions prétrachéales, la haute position du pôle supérieur droit et l'extension sous sternale de la glande de la furent les difficultés non-usuelles que nous rencontrânies dans son ablation. Vu la déviation de la trachée, on eut recours à l'anesthésie endo-

trachéale. Un myxoedème post-opératoire nécessita 3 Gr. de thyroïde quotidiennement afin de maintener un niveau clinique de métabolisme basale.

SUMARIO

El autor presenta un caso tipico de estruma linfomatosa en una mujer de 56 anos de edad. La paciente presento manifestaciones de hipotiroidismo y sintomas locales de presion devidos a un crecimiento difuso de la glandula tiroidea. *Esta glandula habia* adquirido una consistencia muy dura a la palpacion, pero no estaba adherida y su superficie era muy liza. El cuadro clinico justifico el diagnostico pre-operatorio de enfermedad de Hashimoto, que fue comprobado durante la operacion. El mixedema postoperatorio fue controlado con la administracion de 20 *centigramos* de una *preparacion* de glandula tiroidea por dia.

SOMMARIO

L'A. *riferisce* un *caso* di struma linfomatoso. Si tratta di una donna di 56 anni, la quale aveva notato—nei due anni precedenti l'operazione—la comparsa di sintomi di ipotiroidismo, con fenomeni di compressione locale, dovuti ad uno diffuso sviluppo della tiroide. Questa era liscia, dura, con margini netti, *spostabile* nel collo. In base a questi reperti ed ai sintomi clinici simili a quelli caratteristici del morbo d Hashimoto, venne posta la diagnosi di struma linfatico. Questa venne confermata al tavolo operatorio—dalla presenza di sole adesioni pretracheali e dall' aspetto della tiroide: estrema durezza della ghiandola, caratteristica vascolarizzazione superficiale, *estensione retrotracheale* e *posizione* molto elevata del polo destro superiore. Per la deviazione della trachea, venne fatto ricorso all'anestesia endotracheale. La comparsa di precoci sintomi postoperatori di mixedema richiese la quotidiana somministrazione di 0.2 gr. di estratti tiroidei.

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The Treatment of Prostatic Carcinoma*

ROBERT McCAFFERY, M.D. AND ELMER HESS, M.D., F.I.C.S.**
ERIE, PENNSYLVANIA

CARCINOMA of the prostate gland constitutes a problem still to be overcome by the combined efforts of the biochemist, neoplastic biologist, urologist and general practitioner. The finger of the latter is equally as important as the test tube, the laboratory animal and the endoscope. From a clinical standpoint, the rectal examination as office routine is paramount in early diagnosis of prostatic malignancy. With ever-increasing life expectancy in the male population, the incidence of the disease is on the upgrade and requires the careful efforts of the general practitioner for its early discovery. Early diagnosis is today our only weapon in the conquest of prostatic carcinoma. The modern treatment of the disease in those patients brought to the physician by symptoms referable to the genito-urinary system is entirely palliative. We have not yet encountered a patient having such symptoms whose case was amenable to radical cure. This may be changed by the newer concept of hormonal therapy used as preparation for the radical perineal prostatectomy.

The incidence of prostatic malignancy in our clinic is 17.09 per cent based on a six year period.

Table 1.—Hypertrophy of the Prostate

	Simple	*Carcinoma*	*Total*
1941	141	20	161
1942	117	37	154
1943	155	33	188
1944	140	41	181
1945	159	33	192
1946	191	33	224
	903	197	1100

17.09 per cent Carcinoma.

In this time there have been 1,100 cases of prostatic enlargement, of which 903 cases were diagnosed as simple hypertrophy and 197 diagnosed as carcinoma. This percentage incidence of carcinoma is in keeping with the usual findings at other clinics. The rise in actual number of hypertrophy versus carcinoma is interesting, but probably not significant statistically. A year to year variation of this type is not unexpected.

Age incidence of carcinoma of the prostate in our experience is shown in Table 2.

Table 2.—Age Groups

40–50	2
50–60	22
60–70	72
70–80	77
80–90	24
	197

Youngest—47

The highest incidence is in the 60–80 year groups, with the fifth and eighth decades of life showing a somewhat parallel level of incidence. The two cases in the fourth decade serve to call attention to the need for rectal survey in this age group. The youngest case here reported is 47 years old and will be singled out for later discussion. The presenting symptoms in this series are predominantly those referred to the urologic tract. These patients have not been sent to the urologist before the onset of bladder neck obstruction or irritation. The selection of cases for radical attack is thus limited. Most patients have more than one presenting symptom. Hematuria in varying degree often is present as the primary complaint, but is usually a recent symptom in a patient who has had frequency over a more protracted period. The complaint of frequency or of dribbling may often be due to overflow in an obstructed bladder neck. This accounts for the fact that Table 3 shows more symptoms than patients.

The major symptoms which may be called nonurologic are back pain and weight loss, and these are usually present in patients having little or no urinary obstruction, but whose disease has already metastasized to bone or lung. It is in these patients that hormonal therapy with or without castration achieves its most spectacular results in palliation of subjective symptoms. It is safe to state that such therapy does not cure the disease.

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** From the Urological Department, St. Vincent's Hospital, Erie.

Table 3.—Symptoms in Order of Importance

1. Frequency and urgency	89
2. Inability to void	65
3. Back pain	38
4. Weight loss	32
5. Hematuria	21

Patients—197

Metastatic carcinoma of the prostate, in common with malignancy in general, is best diagnosed by x-ray.

Table 4.—X-Ray Metastasis

Pelvis	*Spine*	*Thorax*	*Other Bones*	*Lungs*
46	30	5	9	3

Number of patients showing metastasis—53

Pelvis only	*Pelvis and Spine*	*Spine and Thorax*
14	19	3

Pelvis and Other Bones	*General Metastasis*
8	9

This tabulation shows the x-ray findings of bone involvement in these 197 cases of carcinoma. X-ray evidence of metastasis is shown by 53 The highest incidence is in the spine and pelvis in the same patient, closely followed by lesions in the pelvis alone. Differential diagnosis is the province of the roentgenologist. The correlation of x-ray findings with acid phosphatase levels is both difficult and confusing. The most common bone lesion requiring differentiation is Paget's disease, and in this condition there may be instances of a slight to moderate serum acid phosphatase increase. Skull changes in Paget's disease help make the differential diagnosis.

Table 5.—Adenocarcinoma without Metastasis

95 Cases

Elevated sedimentation rate	5
Elevated acid phosphatase	9

Ninety-five of these patients were diagnosed as adenocarcinoma on the basis of biopsy. None showed evidences by x-ray or on physical examination of metastatic lesions. The sedimentation rate was above 15 mm/1 hr. in five. This test is notoriously unreliable in diagnosis of malignancy, because it is so easily masked by the presence of an infectious process. The finding of an elevated serum acid phosphatase level in nine (9) patients may perhaps only serve to stress the limitations of x-ray and of physical examination in the detection of metastatic lesions. One patient demonstrated 22 King-Armstrong units of acid phosphatase, but metastases were not uncovered. Conversely (as shown in Table 6), 20 cases of adenocarcinoma with metastasis gave an incidence of elevated serum acid phosphatase in 13 cases. Five cases showed normal levels and two cases are not recorded. Here it is evident that x-ray is superior to the chemical laboratory in the detection of metastasis.

Table 6.—Adenocarcinoma with Metastasis

20 Cases

Elevated sedimentation rate	3
Normal sedimentation rate	14
Elevated acid phosphatase	13
Normal acid phosphatase	5

It is also evident that elevation of the sedimentation rate in three of 20 cases leaves much to be desired of this test as an aid in diagnosis.

Patients with absent or minimal symptoms of urinary obstruction were not subjected to biopsy. Diagnosis was made by physical examination and x-ray findings. As shown in Table 7, there were 33 such cases, 6 of whom showed elevated sedimentation rate, 17 showed elevated serum acid phosphatase, while 20 had x-ray evidence of metastasis. Twenty-six of these patients were subjected to bilateral subcapsular orchiectomy as a palliative measure (Table 8). Seven had no surgical intervention. All were given stilbestrol for hormonal suppression of androgenic function.

Table 7.—Clinical Carcinoma without Biopsy

33 Cases

Elevated sedimentation rate	6
Elevated acid phosphatase	17
Metastasis	20

Table 8 shows the number of orchiectomies and the types of cases in which this operation was performed. Of interest is the item referring to 18 cases of clinical carcinoma of the prostate, in which the biopsy specimens were reported as histopathologically benign.

Table 8.—Orchiectomies

Clinical carcinoma	33	Orchiectomy	26
Adenocarcinoma	116	Orchiectomy	87
Undifferentiated carcinoma	27	Orchiectomy	16
Scirrhus carcinoma	3	Orchiectomy	2
Clinical carcinoma with benign biopsy	18	Orchiectomy	10
	197		141

Diagnosis was based upon x-ray and physical findings, and orchiectomy was performed in 10 cases. In several instances the latter procedure was performed upon subsequent admission. In this connection we are in agreement with Barnes and associates,[1] who have shown that rectal diagnosis is superior to biopsy examination, particularly when the specimen is obtained from the urethral portion of the resected gland. They state that sections of tissue obtained from the dorsal portion of the gland near the capsule will show a higher incidence of carcinoma than sections taken at random or from the urethral portion of the gland.

Bilateral subcapsular orchiectomy was performed in 141 of 197 cases of carcinoma of the prostate (Table 8). The operation was not performed in the remaining 56 cases for various reasons, the foremost of which was patient refusal. We try to evaluate our patients from a psychologic as well as a clinical viewpoint. The operation is carefully explained with stress laid upon the fact that only a portion of the testicle is to be removed. It is highly important that the explanation be as lucid as possible as regards loss of potency, especially to the more highly educated or more intelligent patient. These persons expect and should receive a truthful prognosis regarding sex function, and it is the duty of the physician to see that this explanation is truthful and clear. The youngest patient in our series, a 47 year old professional man, orchiectomized on a diagnosis of adenocarcinoma, has since demonstrated the necessity for careful preoperative evaluation. His reaction to loss of libido assumed the form of an extreme psychoneurosis. He states he would rather have lost his life than his normal sex function, and perhaps at his age he has the proper attitude. Preservation of sex function is a large factor in the mind of the average male below 60 and must be considered in those over that age. Of course, we strive for an all-out attack on carcinoma, but we must remember that orchiectomy is but a palliative and not a curative measure. Its unpleasant aspects and sequelae must be balanced against its admitted salutary effects in relief of pain, improvement in weight and lengthening of life expectancy in this grave disease.

The *inactivation of adult prostatic epithelium* subsequent to orchiectomy[2] in some instances can cause enough regression of obstructing local growth to relieve urinary symptoms due to prostatic enlargement. Surgical treatment for obstruction may not be necessary in many of these patients. The same effect is obtainable with stilbestrol or natural estrogen administration due to the androgen-neutralizing properties of the estrogenic substances. We believe that the estrogens are best used in combination with and subsequent to orchiectomy, and that employment of this plan of therapy as soon as diagnosis is made gives better results than the plan which saves orchiectomy and estrogens for last ditch use or than the plan which employs estrogen but reserves orchiectomy to the last.

Operations upon the prostate gland are shown in Table 9.

Table 9.—Operations on Prostate

Patients—197

Perineal	0
Suprapubic	13*
Transurethral	152*
None	34
	199

* Two patients had both

As shown, 197 patients had 199 operative procedures, two patients having had both suprapubic and transurethral prostatectomies. In each instance the resection was done for recurrence of obstruction. Thirty-four patients had no operation. The perineal operations were not used, because radical operation for cure was not deemed indicated in any of the patients.

Hospital mortality is shown in Table 10.

Table 10.—Hospital Mortality

With surgery	9
Without surgery	16
Total	25

Thus, 12.6 per cent or 25 of 197 patients died in the hospital; 16 of these were not subjected to prostatic surgery because of the poor operative risk entailed.

Table 11 shows relief of symptoms in these patients. This is an empirical measure of immediate results with no attempt to give a long term evaluation. A prior report from this clinic tabulated a 3 year follow-up of cases done in 1942–43.[3] Another and more comprehensive report is in the making. As shown in the table, the results vary from the most spectacular to the absolute negative.

Table 11.—Relief of Symptoms

4 plus	39
3 plus	65
2 plus	25
1 plus	13
None	21
No surgery	34
	197

The three- and four plus results total 94 and make up those cases which render the procedures worth the effort. The 21 patients showing no improvement would have been better if not subjected to surgery. The above tabulation is not concerned with the cure of prostatic carcinoma, but only with the relief of symptoms. If patients could be seen before onset of symptoms, we could then employ the radical perineal operation which alone can claim cure of the disease by its complete eradication. This subject is ably presented by Ormond[4] in a recent article. Another procedure of promise is that of preoperative stilbestrol or orchiectomy, followed by radical operation when regression of the tumor has been established.

CONCLUSION

At present we believe that the best plan of treatment is (1) radical operation where indicated; (2) orchiectomy followed by stilbestrol with transurethral resection for relief of pain, regression of the prostatic carcinoma and relief of obstruction. It is our impression that our best results are obtained in cases of adenocarcinoma. The more undifferentiated carcinomas do not respond to estrogenic therapy or orchiectomy.

SOMMAIRE

Actuellement, nous croyons que le meilleur traitement du carcinome de la prostate est:

1. L'opération radicale quand elle est indiquée.

2. L'orchidectomie suivie de l'administration, du stilbestrol, accompagnée de la résection transuréthrale pour soulager la douleur, retarder le process carcinomateux et remédier à l'obstruction.

Les adéno-carcinomes nous ont donné nos meilleurs résultats. Les carcinomes les plus non-differenciés ne son soulagés ni par le treatement estrogénique, ni par l'orchidectomie.

SUMARIO

De acuerdo con los autores el mejor tratamiento del cancer de la prostata, es: (1) la cirujia radical cuando esta es indicada; y (2) la orquiectomia seguida por la administracion de la estilbestrina y la reseccion transuretral para aliviar tanto la obstruccion como el dolor y favorecer si es posible la regresion del cancer. De acuerdo con los autores los carcinomas no diferenciados no responden a la opoterapia estrogenica o la orquiectomia.

SOMMARIO

Il trattamento piu' indicato si riassume: (1) nell'operazione radicale, quando possibile. (2) nell'orchidectomia, seguita dalla resezione transuretrale e dalla somministrazione di stilbestrolo per la regressione del cancro e per alleviare i dolori dovuti all'ostruzione urinaria. I migliori risultati verrebbero conseguiti negli adenocarcinomi. I cancri meno differenziati risponderebbero meno bene alla terapia estrogenica o all'orchidectomia.

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Augmented Action of Anesthetics by Vitamin B_1

GIOVANNI BAZZOCCHI, M.D., AND GIUSEPPE BOCCHETTI, M.D.*
ROME, ITALY

CONSIDERING the relation of nervous trophism to vitamin B_1 and the probably specific curative action of aneurine in many forms of neuritis, the authors carried out some experiments on the sciatic nerves of rabbits to ascertain if any influence may be exerted by the use of vitamin B_1 on the effect of anesthetic drugs used for local and general anesthesia in surgery.

The results obtained from these experiments may be summarized as follows:

1. Aqueous solution of vitamin B_1 brought in contact with the isolated sciatic nerve of rabbits does not exert any anesthetic action, even if used in large doses and in contact with the nerve for a long time.

2. Freely dissected sciatic nerves of a rabbit were surrounded with two small cotton balls of equal weight and size; the balls were saturated with the same amount of anesthetic solution of a given concentration. By adding on one side a little vitamin B_1 (2-500–5,000 I. U. for 5 cc. solution), a remarkably longer duration of analgesia was observed on the side where the vitamin had been added to the anesthetic solution. The induction time of anesthesia was shorter, i. e., anesthesia appeared more promptly. This result was obtained with various anesthetic drugs (percaine, novocaine, procaine, with or without the addition of adrenalin-like substances). Obviously the duration of contact of the anesthetic solution was the same on both nerves.

3. By exposing the sciatic nerve of a rabbit and inducing, on one side, anesthesia with an anesthetic solution of a given concentration, we observed on the other side an anesthetic effect of the same duration and intensity, even when using the same solution diluted to a concentration of one third or one half, to which vitamin B_1 had been added.

It is evident from these experiments that vitamin B_1 possesses the power of increasing the action of the anesthetic solutions used. (See Bibliography.)

After these results were obtained experimentally, the authors carried out clinical researches. On the basis of many cases treated in various hospitals with the same anesthetic method, i. e., by adding vitamin B_1 to the anesthetic drug, the authors found that by adding to the local anesthetic by infiltration from 15–30 mg. of vitamin B_1 (for 60–100 cc. of anesthetic solution), the quantity of anesthetic drug could be remarkably decreased (to about one third or one half of the usual amount).

Thus it was possible, for example, to operate on some extensive hernias by anesthetizing with 10–20 ctg. novocaine diluted with water to which vitamin B_1 had been added.

The advantages of this method of anesthesia are evident: decrease of general toxic action; attenuation of local toxic effect (marginal necrosis, secondary dehiscence of sutures, etc.); possibility of infiltration anesthesia of far greater areas than usually possible.

The authors also point out the renforcing power of vitamin B_1 in spinal anesthesia. They had previously observed that the introduction into the subarachnoid space of any anesthetic to which the vitamin indicated had been added, permitted reduction of the average dose of this solution to one third, while the same anesthetic effect was obtained. No deleterious effects were ever observed, either in wound healing (when using infiltration anesthesia) or any systemic reactions in the case of spinal anesthesia. The troublesome headaches, which occasionally follow spinal anesthesia, were never observed.

The mechanism through which vitamin B_1 exerts its reenforcing action on anesthetics is not as yet known. The authors believe that the results obtained may be interpreted on the hypothesis that vitamin B_1 improves and facilitates the absorption of the anesthetic by

(Continued on page 81)

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* [illegible] University; Director [illegible]

Personal Experience with Carcinoma of the Rectosigmoid and Rectum in Private Practice

ABRAM O. WILENSKY, M.D.
NEW YORK CITY

THE material gathered and studied in this report comprises a personal experience with carcinoma of the rectosigmoid and rectum in private practice. The discussion of the subject includes preparation for operation, operative technic with special reference to preservation of the anal sphincter whenever possible, and follow-up results. The follow-up has been particularly efficient, especially in the last 10 years.

Statistical Information.—There were 83 instances located in the rectosigmoid and in the rectum proper. There were no anal cases. The details are as follows:

	Cases	Cases
Total cases seen		83
Consultations and/or cases not studied personally	22	
Cases clinically inoperable; not explored	11	
Explored and found inoperable	7	
Resections in continuity		15
Combined abdominosacral and/or perineal	7	
Posterior operations	8	
Proctectomy		18
Sacral	16	
Quenu	2	
Local excision		3
Posterior approach	3	
Colostomy		7
Total explorations	7	
Total resections	36	
Total colostomies	7	

DISCUSSION

General Considerations.—In none of the cases in this group was there any hereditary factor. There was no elicitable history of any preceding local lesion, such as hemorrhoids, fistulas, etc, nor of any form of scarring resulting from any such lesion. There was no history of any form of trauma upon which the later appearance of any malignancy could be predicted.

I gave testimony in a case in which a middle-aged man sustained an injury to the sacral region during a fall, and in whom definite evidence of the trauma was alleged to have been visible at the time of injury. Later a carcinoma of the rectum developed, and the plaintiff attempted to establish a causal relation of the tumor to the trauma. No expert evidence was, however, adduced to support this and the contention of the plaintiff was denied.

Lymphatic Spread.—Local extension of the malignancy into the appropriate lymph glands was not present to any great extent. Nevertheless, there is frequent reference in the laboratory reports to penetration of the tumor through the bowel wall and to its spread into the neighboring fat and connective tissue. In practice, the most favorable results are to be expected in cases in which the tumor is entirely within the bowel wall and has not penetrated the external coat. Next in order are the tumors which, although they have succeeded in such penetration, have not involved the lymphatics or other tissues surrounding the bowel. Less favorable are the cases which have penetrated the wall of the bowel and have involved the neighboring tissues and/or the appropriate lymphatic channels and lymph glands. From the standpoint of local and general recurrence, the extent of the growth along the long axis of the bowel is less important than its growth through the thickness of the bowel wall with extension outside. In rectosigmoidal cases, the latter is of great importance because of the physical limitations of the pelvic cavity.

The lymphatic spread from the rectosigmoid is always upward towards the abdominal cavity. If spread occurs in the other direction, i.e., downward, forward and upward into the inguinal glands, it is evidence of the fact that the tumor has originated in or invaded the terminal anal portion of the large intestine, or the lowermost fat and connective tissue of the pel[illegible]ity. As a [illegible]l practical point, one may take it for granted that spread will occur upward if the tumor is at least 3–4 in. from the anal margin, i.e., above the embryologic line of union between the down-growing rectum and the upward-growing anal segment.

Preoperative Local Complications. — The chief local complications in this group of cases included diverticulitis, perforation, abscess, local and/or general peritonitis and obstruction. Diverticulitis is usually the forerunner of perforation, abscess and peritonitis, although this rule is not absolute by any means. Penetrations are usually chronic affairs and appear clinically as localized abscesses. There were two cases of this complication, in which there was no demonstrable evidence that the tumor had originated in a diverticulum. Sometimes it may be thought that the perforation has taken place through a diverticulum which became the seat of inflammation because of its proximity in or near the growth. Commonly it is necessary to drain the abscess at first, establish the presence of a malignancy later, and then act accordingly.

Biopsies.—Preoperative biopsies were always made whenever it was technically possible. Estimations of the prognosis (Brodie's method) from such specimens are not very reliable. No prognosis can be made from the gross appearance of the tumor, and the impossibility of distinguishing purely inflammatory from neoplastic glands only adds to the difficulty. Duke's method of studying the operative specimen is said to be somewhat better. Because of their unreliability none of these methods were employed in any case in this group.

Preparation of Patient for Operation.— 1. Preoperative Complications and/or Intercurrent Disease. Cancerous disease, as illustrated by this group of cases, as is well known, occurs in later life, and the individuals are commonly afflicted with associated and/or complicating conditions and abnormalities which are important factors in the final results. Such conditions include hypertension, cardiovascular disease in general and coronary artery disease in particular, and their associated thrombo-embolic lesions such as pulmonary and cerebral embolism and/or hemorrhage. In all of these cases, judgment of the risk is important. The latter is based upon length of time the disease has existed, number of repetitions of acute episodes, amount of demonstrable damage present, amount of compensatory effort and of reserve still present, and frequency of occurrence and number and extent of their complicating effects upon other organs and systems. In integrating all of these facts, laboratory investigations are not decisive, and for this reason personal experience is a most valuable guide. The patient should, therefore, never be without the attention and the surgeon should never be without the help and advice of a competent internist and/or cardiologist. Cases with renal disease should be well studied from this standpoint also, and the risk contributed by this factor should also be evaluated.

These complications and associated conditions (cardiovascular, renal disease, etc.) are improved as far as possible with medical measures. Frequently time and rest in bed are most important factors, as well as the ability to judge the proper moment for operation. It is regrettable that corrective measures for these conditions are limited.

2. General Factors. The important general factors to correct include (1) malnutrition and dehydration, (2) any protein deficiency and hypoproteinemia and (3) any anemia. Correction of these conditions, fortunately, always go together. The measures include parenteral glucose in saline, hydrolysates, plasma and blood transfusions. These are given according to indication and to the extent necessary for correction of the deficiency. A sufficient quantity of the necessary vitamins is also supplied.

3. Diabetes. This is also a fairly frequent complication. Fortunately, with modern methods, this factor presents no difficult problem.

If good recovery from any operation and efficient healing of the operative wounds are to be expected, all of these complications and deficiencies must be corrected before, during and after operation. Success depends many times upon well carried out, efficient and unhurried preparation of the patient to the extent commensurate with the amount of deterioration and the degree of any complication, as well as on a well planned and well carried out operation. Emphasis must be placed upon the fact that the preparation must never be hurried.

4. Local Preparation. Local preparation of the bowel is done as thoroughly as possible. Nevertheless, if drastic cathartics are necessary, a sufficient interval should be allowed to enable the bowel to recover from the extraordinary stimulation before operation, as otherwise there is much discomfort from postoperative distention.

Anesthesia.—In this series of cases, spinal anesthesia was used exclusively except when contraindications were indubitably present. In this experience, the usually accepted contraindications—cardiac disease, advanced pulmonary disease, hypertension, etc.—were not so accepted, because it has been my experience that even these patients stand spinal anesthesia better than any other. A direct contraindication and practically the only one accepted was the presence of an intestinal opening with or without fecal discharge in the immediate proximity of the point of entry of the spinal needle because of danger of infection. Then some form of general inhalation narcosis was used To put it epigrammatically, I feel that when spinal anesthesia can be used, no other form of anesthesia approaches it; when some other form of anesthesia must be used, no one of the latter has any superiority over the others. Rectal anesthesia was never used.

OPERATIVE PROCEDURES

Operability.—About 60 per cent of the cases coming to operation were found suitable for primary radical removal of the growth. The radical operation is technically possible when there are not too many adhesions to neighboring viscera, when the tumor has not grown into the pelvic wall, when adjacent viscera are not too extensively involved, when lymph node metastasis is not too extensive and when distant metastases are not present in the abdominal or other viscera.

The size of the tumor bears no relation (1) to the lymph node enlargement, (2) to the presence of metastases, (3) to the operability of the growth, (4) to the feasibility of its removal and (5) to the possibility of retention of the sphincter. The size of the tumor is usually of no significance technically, and in any event the tumor is usually relatively and actually small. Its relative position in the rectum or rectosigmoid is not important.

General factors, such as the general condition of the patient, often only serve to delay performance of the radical operation until such time as the condition is satisfactory.

It seems unnecessary to add that the radicality of any operation is in direct proportion to the earliness of diagnosis and of operation. A very important physical factor is obesity: the operative procedure is much more difficult, and the incidence of infection is greater and of much more serious nature when it occurs. This can be an almost insurmountable obstacle to the performance of the operation, to the subsequent recovery of the patient and to the healing of the wound.

The success of the operation in this type of major surgery is always in direct relation to the skill and experience of the operator, to the helpfulness and teamwork of the assistants and to good postoperative nursing care.

Primary Nonobstructive Resections.—In our cases primary resection was always done in one stage with preservation of the sphincter, and without colostomy wherever and whenever possible. I believe greatly in one stage operations for the following reasons: (a) one can always do a cleaner and a much more satisfactory job; (b) other things being equal, the mortality is less in my experience than in multiple stage operations; (c) in this class of patient, especially those in later life, a first stage operation and even an exploration carries mortality; (d) in second stage operations, operative difficulties are increased; (e) the danger of infection increases with each stage; (f) the final closure of any colostomy has considerable risk.

Tumors in the upper part of the rectosigmoid in favorable cases can be safely done in one stage from above without colostomy. Nevertheless, such resections are sometimes difficult.

The technic includes sufficient (a) ligation of the mesosigmoid and freeing of a sufficient length

"Drawing Through" Operations.—No case in this series has been done by the "drawing through" method (Mandl and Goetz,[3] Hochenegg[2]). The "drawing through" operation is not as successful as the end-to-end suture. Secondary abscesses are common and because these are often dangerously difficult to drain properly, the operation is usually a technical failure.

Local Resection.—In this series were several cases in which the disease was permanently eradicated by a local excision. This is especially applicable to malignant adenomas, in which the malignancy is usually at the periphery and in which the base is not involved. An example is the following:

> In 1928, a malignant adenoma about the size of a tangerine was removed by local resection which did not include the entire circumference of the bowel, through the sacral approach. At the 10 year follow-up examination, the patient was perfectly well in every sense of the word.

Obsructive Resections.—In the presence of any degree of obstruction, the bowel was first decompressed by formation of an artificial anus. In doing this, the latter was always made sufficiently far away from the tumor, so that the subsequent secondary radical removal would not be technically hampered. In rectosigmoidal tumors this meant a cecostomy or a transverse colostomy. The actual removal of the tumor was done at a second stage. When the primary colostomy was done far away from the site of the tumor, it was possible to do the resection without changing the technic of removal from that in unobstruced cases, and there was no difficulty from the presence of adhesions formed in and after the primary decompression operation. Under these conditions the risk of the secondary radical removal was least. When the fistula was close to the tumor-bearing area, as when a sigmoid colostomy was too close to a rectosigmoidal cancer, the risk was greater; so that in later cases the colostomy was always made on the right side with obstructive rectosigmoidal growths.

Colostomy.—In making a colostomy, I have operated as follows:

> The abdominal incision is not made unduly long. After the bowel has been satisfactorily delivered outside of the abdominal cavity, interrupted sutures are taken all around the incision including the peritoneum, the fascia and the skin, and the ends are left long. One end of the suture then picks up the bowel, as nearly as possible always in the longitudinal striae only through the muscular layer. When the sutures are tied, the skin becomes approximated to the peritoneum, and the raw area in the thickness of the abdominal wall is entirely covered and protected from any infection. The bowel hangs by a purely peritoneal attachment. A narrow gauze tape is packed all around in the crevice between bowel and skin, and the surrounding abdominal skin area is covered with vaseline gauze and the whole area by an outer thick dressing. In my experience, such a wound has never broken down and the wounds heal by primary union. There is a minimum of postoperative care.

Palliative Colostomy in Inoperable Cases.—In this series no palliative colostomy was done in the presence of a general abdominal carcinosis or whenever it seemed that the span of life remaining was of very short duration. Palliative colostomy was reserved for those cases in which the tumor was locally inoperable for any reason or in which the distant abdominal metastases were not too many or extensive. Colostomy was done in these cases in the belief that many such tumors are relatively slow-growing, and that because of this the presence of the colostomy would obviate any possible later obstruction and would contribute materially to the comfort for the remaining time of life. I do not believe that palliative colostomy is otherwise indicated.

Chemotherapy.—Ever since chemotherapy was available, it was used in this group of cases both preoperatively and postoperatively as a prophylactic measure. Preoperatively all cases were given large doses of sulfasuxidine for at least three days prior to operation. At the completion of operation, sulfanilamide powder was insufflated over the entire operative field both intraperitoneally and in the abdominal wall. Only a thin layer of the powder is necessary; thick masses lead to caking and to later dangerous complications.

In the immediate postoperative period chemotherapy was used in addition as a general measure and consisted of large doses of penicillin at three hour intervals given hypodermatically and of sodium sulfadiazine given intravenously with the parenteral fluids and, as soon as possible, by mouth. This was continued until all signs and danger of a general or local infection had passed and with due regard to any toxic manifestations.* It is my experience that both of these agents together have a better effect than either one alone.**

POSTOPERATIVE MANAGEMENT

Immediate Care.—The routine immediately after operation comprises: (1) parenteral alimentation † including (a) glucose and saline infusions, either alone or (b) combined with intravenous amino acids and (c) plasma and/or blood transfusions given in the order of the severity of the indication. Sufficient of the necessary vitamins were also provided. (2) As soon as the immediate reaction from the operation was seen to be good, simple fluids without solid content were permitted by mouth to the capacity of the individual to which the amount of parenteral alimentation was adjusted. (3) Due attention was continued to any preoperative associated condition (cardiac, renal, diabetes, etc.). (4) Food is given as soon as the bowel has begun to act; parenteral alimentation is then proportionally discontinued; thereafter a high caloric, high protein, otherwise balanced diet is given which will have the least residue.

Bladder and Bowel Function.—Bladder function has never been a difficult problem in any of the cases in this group. No attempt was made to evacuate the bowel until some gas had been spontaneously expelled; when indicated, this might be aided by prostigmine administered at six hour intervals. In favorable cases, fecal elimination will occur without further aid, but in any case no cathartic is given for at least six days after operation. Any rectal accumulation is determined by the examining finger, and on occasion the intestinal function may be started by giving a very low and small enema.

All of the above was always tempered as indications arose by the immediate needs of the occasion. As a general rule, however, this routine has been and can be followed regularly without much modification.

Wound Dressing.—The first routine dressing of the wounds was not done until the fifth or sixth day. Thereafter dressing was done as infrequently as possible with due regard to any fecal leakage.

Early Ambulation.—In this series, no patient was permitted out of bed until general physical condition and state of local healing in the operative area and in the abdominal wall was satisfactory, in addition to the satis- [illegible] wel. This usually [illegible] purely posterior operations, to within the second week for combined operations. In my experience early ambulation, i.e., getting a patient of this type out of bed on the first or second day following the operation, is neither consistent with the strenuousness of the operation and the strength of the patient, nor does it eliminate those complications which early ambulation is said to prevent. In this series, there was no instance of postoperative thrombosis or embolism.

[illegible]

No case in [illegible] therapy as a pr[illegible] before operation. On [illegible] exceptions [illegible] radiation [illegible] intensity [illegible] diminish [illegible] which [illegible] the [illegible]

[illegible]

[illegible]

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* There has been an experience in another series of cases in which penicillin was followed by a scarlatiniform and urticarial rash, vomiting, temperature of 105 and exitus. (Wilensky: J.A.M.A. 131:1381, 1946.)

** This was illustrated in a case of pyle[illegible] in which a cure was obtained finally by such com[illegible] of penicillin and sulfadiazine. (Wilensky: New York State J. M. 44:2082, 1945.)

† A good formula for the parenteral [illegible] is the following:

Amino-acids	30 Gm.
Solu-B	1 ampul
Glucose (5 per cent) in normal saline solution	1,000 [illegible]

A safe rate of speed for the administration [illegible] to the minute.

Solu-B is a vitamin preparation [illegible] intramuscular use. Each ampule [illegible]

Thiamine hydrochloride	[illegible]
Riboflavin	[illegible]
Pyridoxine hydrochloride	[illegible]
Calcium pantothenate	[illegible]
Nicotinamide	[illegible]

Only one ampule is given in 24 hours.

abscesses or fecal leakage of a temporary nature; (b) intestinal obstructions which have also occurred much later; (c) stricture of the stoma which occurred in one case; and (d) new pulmonary complications. These complications which had existed before operation, usually continued and were treated accordingly.

Complications in Healing of Resections in Continuity.—Fistulas persisted in five of the cases of resection, three in the combined group and two in the posterior approach group. These and their final results are as follows:

1 case: closed spontaneously after several months. Follow-up "well," 10 years.

1 case: easily closed by simple plastic operation. Follow-up "well," 10 years.

1 case: fistula was about ⅛ inch in diameter and could easily have been closed; the patient refused this. Follow-up "well," 10 years.

1 case: posterior resection; a rather large cloacal opening remained; two unsuccessful attempts were made to close this, the last time after diversion of the fecal stream by cecostomy; this might possibly be due to radiation therapy effect on the tissues. Follow-up otherwise with no recurrence, 2 years.

1 case: combined abdominoperineosacral resection in continuity with preservation of the sphincter in November, 1944. Healing disturbed by partial subcutaneous rupture of wound in spite of layer suture reenforced with through-and-through tension sutures. Thereafter repeated bouts of temporary ileus always spontaneously relieved until March, 1945. Then an episode occurred for which operation was necessary. The obstruction lay in the loop of small intestine in the ventral hernia. In freeing this, an opening was inadvertently made, and the latter was then made use of as an enterostomy. Because this was very high up, all nourishment escaped practically immediately through the fistula. In order to correct this, a third operation was necessary in which (1) the general abdominal cavity was entered, (2) the loop in the hernia was disconnected at both ends from the rest of the alimentary canal with closure of both ends intraperitoneally, and (3) with reestablishment of the intestinal continuity by anastomosing both stumps of the small intestine where the loop had been disconnected and cut away. The loop was left in situ and drained through the original external opening. At the present writing—February, 1947—over two years after the primary resection, the bowel functions normally, the intestinal fistula drains variable amounts of jejunal secretion, there is no demonstrable recurrence or metastasis of the tumor, and the patient feels well and goes about his business.

RESULTS

The following is a detailed summary of the results:

Results—All Types of Operations

	Cases	Cases
Died		9
Resections	5	
Proctectomy	2	
Colostomy	2	

Follow-Up

	Cases	Cases
Recurrences		4
1 year, recurrence in inguinal glands	1	
2 years		
Abdominal	1	
Local	1	
3 years, benign intestinal obstruction	1	
Follow-Up "Well"		22
1 year	3	
2 years	5	
3 years	1	
4 years	2	
5 years	1	
7 years	1	
8 years	1	
9 years	1	
10 years	6	
25 years	1	
No Follow-Up		8
No follow-up	3	
Palliative colostomies	5	

Results by Types of Operation

	Cases	Cases
Resection in Continuity		8
Posterior approach		
Follow-Up "well"		
10 years	2	
3 years	1	
2 years	2	
1 year	1	

Results by Types of Operation (Continued)

Recurrences		
1 year	1	
Died		
1 year (benign intestinal obstruction)	1	
Combined Operations		7
Follow-Up "well"		
10 years	2	
No follow-up	1	
Operative death	2	
Gas bacillus infection	1	
Proteus general infection	1	

Proctectomy

	Cases	Cases
Posterior Approach		16
Follow-Up "well"		
9 years	1	
8 years	1	
5 years	1	
4 years	1	
2 years	2	
1 year	2	
Recurrences—local		
3 years	1	
Metastases—distant		
3 years	1	
2 years	1	
Operative deaths	2	
No follow-up	3	

Quenu

	Cases	Cases
Follow-Up "Well"		2
7 years	1	
2 years	1	
Local Excision — Posterior Approach		3
Follow-Up "well"		
10 years	2*	
25 years	1**	
Palliative Colostomy		7
Operative deaths	2	
No follow-up	5	

SUMMARY

Eighty-three cases of carcinoma of the rectosigmoid and rectum are studied with attention to statistical information, preparation of the patient, various forms of operative treatment, chemotherapy, radiation therapy and results with follow-up observations. There was a 60 per cent operability and an immediate mortality of 10.9 per cent. The survival rate in 22 cases which underwent radical operation was as follows: 12 patients were alive and well at the five year period; 9 additional patients were alive and well at the 10 year period; and one patient is alive and well after 25 years.

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* These two cases were pedunculated growths in which it seemed that a local excision would be sufficient. However, the histologic report was carcinoma, but the patients have remained well nevertheless and are still being seen.

** This was a carcinomatous ulcer in the rectum, the third, apparently independent, manifestation of malignant intestinal disease in a single individual. A local excision was done in the unwillingness to "give up." The man is still being seen and he is entirely well since.

AUGMENTED ACTION OF ANESTHETICS BY VITAMIN B_1

(Continued from page 72)

nerve structures. This is plausible because vitamin B_1, when used alone, does not exert any anesthetic effect; its power of increasing the anesthetic action becomes gradually less active or may even disappear, when the dose of anesthetic drug used is gradually decreased or attains its minimum.

SUMMARY

The authors have demonstrated, experimentally and clinically, that vitamin B_1 possesses the power of increasing the effect of anesthetic drugs used in surgical practice, either by local infiltration or by general or spinal anesthesia.

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The Concept of Pyloric Balance in Ileus*

WILLARD BARTLETT, JR., M.D., F.A.C.S.**
ST. LOUIS, MISSOURI

THE use of the stomach tube for the aspiration of gastric and upper intestinal secretions in the treatment of ileus originating either from intraperitoneal infection or from primarily physical crippling of the small intestine goes back more than 60 years. The monograph, "Intestinal Surgery," by Nicholas Senn,[1] should be required reading for medical students, who currently seem to be led to believe that intestinal decompression by other than operative means is a therapeutic measure originating after 1930. Senn in 1889 quoted extensively such German surgeons as Kussmaul, Kuester, Rehn and Heusner who advocated decompression not only in preparation for surgical attack on the cause of obstruction but as the sole definitive treatment under certain circumstances. These early proponents of such therapy noted that it accomplished three objectives: diminution of intra-abdominal tension, relief of distention of the obstructed loops and decrease in the violence of their peristalsis by evacuation of their contents. In 1924, Matas recorded his experience with continuous drainage of the stomach by the Jutte tube with numerous case reports and advocated such decompression "in all obstructive or paretic states of the bowels."[2] He commented, "By draining the stomach, the gastric tube acts in reality as an artificial anus which empties the upper intestine of its toxic contents and diminishes the abdominal tension caused by the pent-up gases, thereby adding enormously to the comfort of the patient."

Yet continuous syphonage of the gastric or duodenal contents through the indwelling nasal catheter required frequent aspiration by syringe to reestablish syphonage and placed a heavy demand on nursing personnel prior to the publication by Robertson Ward[3] in 1930 of a device for the application of constant *suction* to the Levin tube. Ward recorded the use of this method in the postoperative care of patients with paralytic ileus with or without peritonitis, intestinal obstruction, acute gastric dilatation (with which he was primarily concerned) and for persistent postoperative vomiting without ileus for a period of five years in the University of California Hospital. His conception of continuous suction was almost solely limited to that of symptomatic relief of distention and nausea.

Unquestionably, however, in the years prior to 1930 the majority of surgeons favored enterostomy as the method of choice in the decompression of the bowel in ileus, of whatever origin, with general agreement on the proviso that, to be effective, it must be performed before the disappearance of peristalsis.[4] In the light of present knowledge, the earlier preference for enterostomy as a means of decompression in full-blown ileus can be readily understood. It was, in the majority opinion, more certain of achieving successful decompression and was life saving in such instances. The reasons for this were threefold:

1. There was, generally, failure to realize that the clinical picture in advanced ileus was much the same whether the origin lay in peritonitis or in a purely mechanical obstruction, yet advanced ileus was usually the presenting picture with which the surgeon was confronted. The possibility of differentiation by x-ray examination between paralytic ileus in an early phase due to peritonitis and the early stages of mechanical intestinal obstruction was not widely appreciated for fully 10 years after the first publications by Case[5] in 1915. The inexactness of clinical differential diagnosis during the earlier phases of the disorder even in patients under hospital treatment is exemplified by Wilkie's[6] report of 1928, that in a series of patients dying of alleged peritonitis with paralytic

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** From the Dept. of Surgery, St. Louis University School of Medicine.

ileus within 10 days after appendectomy autopsy revealed mechanical intestinal obstruction in 75 per cent. In such instances, of course, enterostomy was at its best in any but the terminal state.

2. Of possibly greater importance was the inadequacy of replacement therapy as we know it today. Prior to the formulation by Coller and Maddock[7] and their associates in 1934 of quantitative rules for replacement and maintenance of tissue fluids, there was only a limited realization of the principles to be followed in the hydration of the patient with abnormal fluid losses or of their shifts within the body though the basic importance of losses of water and sodium chloride in experimental, simple intestinal obstruction, had been established some 10 years previously.[8, 9] It was not realized that large protein losses from the plasma into obstructed loops took place, nor were plasma, human serum albumin and amino acids available. Such an excellent clinical observer as my father who advocated repeated blood transfusions for all patients who were gravely ill ("When in doubt, transfuse!") was criticized for using blood transfusions too freely, in a period when the importance to the circulation of maintaining the total plasma proteins was barely suspected. Nor was oxygen administered continuously to patients who were not grossly cyanotic. Obviously, the race, to be won, had to be run swiftly. Once ileus developed, the usual supportive treatment consisted of occasional gastric lavage, the daily vicarious administration of 1 or 2 liters of isotonic solution of glucose and sodium chloride, hot stupes to the abdomen and liberal amounts of morhpine. Enterostomy, when effective, achieved decompression far more rapidly than did gastric or duodenal intubation by the indwelling nasal catheter. While awaiting the slower decompression of the latter method, the poorly supported patient might well die of peripheral circulatory collapse. In the average hands, in brief, enterostomy was safer *because* it was faster.

3. Finally, there was too rigid a conception (a) of the obstructive episode and (b) of the pathologic factors in the bowel itself at the site of simple, mechanical obstruction. The dramatic features of the management of late intestinal obstruction, in which the patient was frequently transported from the ambulance entrance directly to the operating room, made a thoughtful consideration of earlier events in the patient's history impossible. The operative mortality of abdominal exploration in the presence of distention, whether completed by a definitive operation or by enterostomy, was approximately 50 per cent and the survivors had a stormy course, usually with persistent ileus for several days.

To recapitulate, only the surgeon who was familiar with the symptomatic relief afforded by the indwelling nasal catheter, who performed enterostomy by a technic[10] that deliberately precluded the possibility of abdominal exploration (other than visualization of the nature of the peritoneal fluid) and whose plan of supportive treatment was adequate, was likely to arrive at the realization (1) that the state of relatively complete obstruction was often transient even though the obstructing mechanism was not attacked directly and (2) that the palliative effects of nasal catheter decompression could be extended into the therapeutic field as adjuvant or even as the sole definitive treatment of the episode of acute obstruction.

Having made use of continuous syphonage, prompted by intermittent syringe aspiration, as adjuvant treatment with enterostomy in all forms of ileus, I was much impressed with the increased efficiency of suction during personal observation of Ward's use of his device in postoperative care in 1930 and applied it in the management of subsequent patients. In 1931, the following views were formulated and recorded:[11]

1. Patients with mechanical, small intestinal obstruction presenting themselves with advanced ileus remotely after previous abdominal operation or intraperitoneal infection frequently give a history of previous, milder obstructive episodes. The obstructive agent is present at all times, and the patients should be regarded as having been in a stage of chronic, incomplete obstruction, frequently asymptomatic.

2. The onset of acute, relatively comp[illegible] obstruction is b[illegible] [illegible]lema

spasm of the bowel itself at the site of crippling.

3. When adequate decompression of the obstructed loops is accomplished by enterostomy or by nasal catheter suction, edema and spasm of the bowel at the site of obstruction subside sufficiently so that emptying of the obstructed loops proceeds distally as well as proximally and the patient reverts to a state of chronic, incomplete obstruction.

4. Adequate supportive treatment will keep patients on a decompression regime in metabolic balance.

5. After decompression has been successful, further investigation of the nature of the obstruction and its definitive correction should be carried out under elective conditions.

Wangensteen's[12] publications on decompression therapy began to appear shortly thereafter, and he and his coworkers have performed an unequalled service to patients with intestinal disorders of an obstructive nature and to all abdominal surgeons in popularizing[13] the understanding of the principles by which most patients with advanced ileus might be salvaged. His views and mine have necessarily coincided almost exactly, since our arrival independently and almost simultaneously at the same understanding of the situation followed from similar earlier experiences with decompressive enterostomy and supportive therapy.

The possibility of adding to our knowledge of the pathologic physiology of the obstructed small bowel interested me greatly, once the therapeutic value of continuous suction had been established. Study of our earlier suction records led to the elaboration of the concept of "pyloric balance,"[14] which is the quantitative expression of the rate and direction of movement of fluids through the pylorus per unit of time. Disappearance of gastric secretion and ingested fluid in a physiologic direction from the stomach is termed a *positive* balance. The opposite condition, such as occurs with the return to the stomach of high intestinal secretions, is termed a *negative* balance. The pyloric balance, whether negative or positive, is the resultant of two factors, the tonus of the intestine and the degree of obstruction, with one probable exception to be discussed later. We have commented on the clinical observation[14] that peristalsis disappears before tonus in advancing ileus and have repeatedly seen effective decompression either by nasal catheter or by enterostomy after peristalsis had disappeared. So long as the bowel retains tonus, therefore, decompressive therapy may be expected to be successful except in the presence of closed loops.

By accurately recording the amount of ingested fluid and the quantity recovered by nasal catheter suction, one may follow intelligently the progress of ileus and express in quantitative terms the function, or the degree to which function is failing, of the intestine throughout the course of the obstructive episode. I have not found it useful to measure the quantity of gas or air recovered by suction, though Wangensteen once thought it important to do so. One cannot differentiate quantitatively between the sources of recovered air, whether it has been swallowed recently or whether it has been recovered from the intestine as a portion of the contents of the obstructed loops. It has seemed desirable from the first that the nasal catheter be permitted to pass only into the stomach in most cases, for, as pointed out repeatedly, the pyloric reflex is lost early in ileus in most cases, to be regained only as it subsides. No harm ensues by having the tip of the catheter in the duodenum in the early phases of decompression, but permitting it to remain there, beyond the pylorus, will lead to the continued recovery of duodenal contents and dehydration of the patient at a later time when the obstructed loop is actually beginning to empty distally through the site of obstruction. This will be reflected on the chart as a falsely negative balance. This risk is not present with the catheter proximal to the pylorus, for with the recovery of the pyloric reflex the patient will go on to the achievement of a positive balance of considerable size, emptying ingested fluids as well as gastric secretions into the duodenum despite the continuation of suction. As pointed out by Coller and Maddock,[7] the quantity of fluid represented by the negative pyloric balance constitutes a loss to the body which must be replaced parenterally, hence its accurate estimation is essential to the planning of hydration of the patient. It is no fault of the method that suction therapy is carried out so frequently with no systematic recording of the data essential to intelligent management of the case.

TABLE 1.—PYLORIC BALANCE IN POSTOPERATIVE ILEUS, LOW PLASMA PROTEIN, NO INFECTION OR OBSTRUCTION

Day postop.	1.	2.	3.	4.	5.
M.C. (1937) Supravaginal hysterectomy, Hb 40, rbc 2.7 m.					
Os	1,640	480T	450T		
—B	2,150	490	120		
=P.B.	—310	—10	+330 in 8 hrs.		
O.D. (1935) Excision liver cyst, secondary lap. for hemorrhage					
Os	0	240	1,920	720T	
—B		120	1,050	50	
=P.B.		—120	+870	+670 in 5 hrs.	
G.J. (1936) Panhysterectomy Hb 52, rbc 3 m., p-o shock					
Os	0	0	435	900T	1,215T
—B			425	760	90
=P.B.			+10	+140	+1,125 in 5 hrs.

T. . .Test with nasal catheter occluded, suction resumed 5 min. $\bar{q}$ 2 hrs.

Continued observation of patients with ileus of all types and grades and the maintenance of records of detailed clinical observation for correlation with their charts on pyloric balance lead me to believe that the latter has diagnostic and prognostic implications beside its merits as a day-to-day system of reckoning. These are exemplified in the tables.

1. The ileus that so notoriously follows abdominal operations on patients with low total plasma proteins, even though the bowel itself is not operated on, is characterized by a small negative pyloric balance, rarely as large as 500 cc. Peristalsis was not heard in any of the illustrative cases on the first postoperative day. None of these patients received fluids by mouth prior to the starting of suction, which was begun before onset of distention (except in the third case) because of slight, *occasional* vomiting and continued absence of peristalsis.

2. Negative pyloric balances of greater magnitude are seen, however, in ileus due to peritonitis. An extreme example is given in *Table 2, illustrating the pertinent events* in one of two patients with primary streptococcal peritonitis under my care in a naval hospital in 1945 during an epidemic of streptococcal infections (Type A, strains 17 and 19). After preliminary decompression was accomplished, the pyloric balance reached a figure of 1,700 cc. on one day and frequently exceeded 1 liter per 24 hours. One cannot exclude the possibility of there having been a transient mechanical (adhesive) obstruction during this phase. Localized peritonitis

TABLE 2.—PYLORIC BALANCE IN ILEUS DUE TO PRIMARY GENERALIZED STREPTOCOCCAL PERITONITIS (1945)

Appendectomy performed to exclude appendicitis, acute. *On penicillin and sod. sulfadiazine.*

Day	P.B.	
1.	—2,500	distended. On contin. oxygen. T.106(F)
2.	—1,400	no peristalsis
3.	— 230	icteric; less distention
4.	— 350	*cyanosis and edema (salt)*
5.	—1,000	improving, no distention
6.	?	
7.	?	
8.	—1,700	cyanosis and edema (salt); distended
9.	—1,200	improving, peristalsis returning
10.	—1,000	oxygen disc., no distention
11.	+ 100	on test. Tube removed
12.		soft diet

is usually accompanied by a daily negative balance of 500 cc. to 1 liter.

3. The extremes of negative pyloric balance are seen in simple mechanical obstructions which are fairly complete. The largest of which I have record are given in Table 3, in which high jejunal obstruction was practically complete, as evidenced by acholic stools; daily negative balance, after initial decompression, frequently exceeded 2 liters. Peristalsis was heard regularly, perhaps from the loops below the high obstruction, after the first few days though the negative balance remained large until operative correction of the obstruction. In Table 4, a negative pyloric balance of more than 1,500 cc. is seen in an obstruction of the ileum that was incomplete enough to allow gas to pass into the colon. Peristalsis returned when the fluid contents of the obstructed loops began to empty distally. In general, cases of relatively complete intestinal obstruction show negative pyloric balances of more than 1 liter, usually more than 1,500 cc., daily prior to obvious distal emptying.

TABLE 3.—PYLORIC BALANCE IN HIGH JEJUNAL OBSTRUCTION

W.M. admitted (1934) with acholic stools, nearly complete obstruction due to jejunal ulcer following gastro-enterostomy.

Hosp. Day	P.B.	
1.	—4,200 cc.	
2.	—2,600	
3.	—1,700	
4.	—2,700	peristalsis returned
5.	—2,390	bile in stool
6.	—1,540	
7.	—1,900	
8.	—2,505	
9.	—1,490	day of operation
10.	—2,075	
11.	+ 360	
12.	+ 500	first postop. stool
13.		nasal tube removed

required occasional aspiration to 14th postop. day.

Partially closed loops constitute a special case in the behavior of the pyloric balance. They do not show as large negative balances as expected in a similar grade of simple mechanical obstruction, and I have been able to predict their presence in the last two such cases by failure of decompression (clinically and by x-ray) in the presence of negative balances of less than 1,200 cc. The recovered bowel contents has, in each case, been distinctively duodenal and high jejunal in character, rather than low ileal ("fecal"). The early findings in such a patient are shown in Table 5. Further study is needed to clarify the situation in these instances, however. I classify them as having "partially" closed loops, however, because I believe that some portion of their fluid contents is escaping from the loop both proximally and distally.

TABLE 4.—PYLORIC BALANCE IN SIMPLE ACUTE OBSTRUCTION OF ILEUM

L.W. admitted (1946) with obstruction of 32 hrs. Distended, no peristalsis. Resection of sigmoid 10 months previously.

X-ray: 2 fluid levels, small intestinal patterns, gas in colon.

Hosp. Day	P.B.	
1.	—1,600	typical ileal contents
2.	—1,900	passed flatus; distention persists; x-ray: unimproved
3.	—750	peristalsis present; x-ray: improved
4.	—500	in 12 hrs., tube removed. No distention.

Low residue general diet thereafter.

Exploration on 12th day in hospital: division of multiple bands and repair incisional hernia.

Postop. suction for 24 hrs.

TABLE 5.—PYLORIC BALANCE IN ACUTE, LOW JEJUNAL OBSTRUCTION WITH *PARTIALLY CLOSED LOOPS*

G.H. admitted (1946) with obstruction 40 hrs, 3 previous laparotomies (not for obstruction). Dehydrated, distended, loud peristalsis mixed with sounds of ileus.

X-ray: multiple fluid levels, small intestinal patterns, no gas in colon.

Neg. pyloric balance only 600 cc. in first 16 hrs. (no ileal contents) without improvement in local or x-ray signs.

Operation on day after admission, finding (a) internal herniation distended low jejunum, (b) partial volvulus 3 foot section of ileum, both due to heavy bands between omentum and mesentery.

Postop. suction for 24 hours.

4. One not infrequently encounters the combination of peritonitis and mechanical obstruction, together or successively, in a patient. The behavior of the pyloric balance during the development of extrinsic obstruction due to

TABLE 6.—PYLORIC BALANCE IN ILEUS WITH PERITONITIS PLUS MECHANICAL OBSTRUCTION

J.S. (1936) Appendectomy and drainage pelvic abscess.

Day P-o.	P.B.	Day P-o.	P.B.
3.	—550 decreasing	10.	—150
4.	—795 distention	11.	—140
5.	—1,450	12.	—290 flatus, stool
6.	—1,090 peristalsis	13.	+905
7.	—1,355 present	→ 14.	—2,190 suction disc. 12 hrs.
8.	—750	15.	—390 suction resumed
9.	—940 T. to 101	16.	—665 T. 100 daily
10.	* operation	17.	—710 good peristalsis
		18.	—550
		19.	—190 suction $\bar{q}$ 2 hrs.
		20.	tube removed

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* *Secondary laparotomy: staying in clean peritoneum on left side, stripped small bowel, divided 2 obstructing bands and performed lateral enterocolostomy.*

organizing plastic exudate is shown in the first column of Table 6. Recovery during the first four days after secondary laparotomy proceeded smoothly with the development of a positive balance, but the patient developed another obstruction, due, I believe, to local peritonitis about the site of enterocolostomy; there was ample evidence for this belief in the temperature curve, leukocyte counts and the finding of localized tenderness.

5. It is of importance to follow the behavior of the gastric and upper intestinal secretions in gastro-enterostomy and gastrectomy. In Table 7 is shown the behavior of what should, I suppose, be labeled the "stomal" balance, since the pylorus has been removed during a subtotal gastrectomy, with perfectly smooth recovery. The subject of Table 8 had an unhappier time. His physician had had him on *intermittent suction* for 10 days because of high grade pyloric obstruction without decrease in the obstruction, and he had lost some 20 per cent of his average weight. There was undoubtedly diminished total plasma protein in this case, which accounts for his failure to empty through the stoma earlier. A complementary gastrostomy with a no. 24 catheter was performed at the time of gastrectomy in order to spare him further nasal intubation, and suction was applied to the catheter.

TABLE 7.—"PYLORIC" BALANCE AFTER GASTRECTOMY

S.D. (1947) 75% gastrectomy for gastric ulcer. *Posterior Polya "no loop."*

Day	Os.	Bottle	P.B.
Op.	380	400	— 20
1.	630	600	+ 30 peristalsis
2.	540	700	—160 tube removed; stool
3.	450	15 cc. aspirated after 24 hrs.	

If one accepts the commonly given figure of 5 liters as the total of daily gastric and small intestinal secretions, it becomes obvious that the largest negative balances seen clinically do not approach this figure. There are three possible explanations for this: (1) Obstructions termed "complete" clinically may be actually only relatively so, and a certain percentage of fluid, if not gaseous, contents of the obstructed loops may pass distally for reabsorption in the lower segments. (2) Gastro-intestinal secretions may diminish in volume below the normal in the presence of

TABLE 8.—"PYLORIC" BALANCE AFTER GASTRECTOMY

B.K. (1947) 75% gastrectomy for *obstructing* gastric ulcer. Posterior Hofmeister plus gastrostomy.

Day	Os.	Bottle	P.B.
Op.	570	600	—30
1.	900	1,450	—550
2.	965	1,750	—785
3.	835	1,850	—1,015 tube clamped
4.	210	950	—740 suction $\bar{q}$ 2 hrs., x-ray
5.*	780	1,000	—220 suction $\bar{q}$ 6 hrs.
6.	1,150	1,160	—10
7.	1,590	1,350	+240 soft diet
8.	1,485	975	+510
9.	gastrostomy tube removed		

X-ray on 4th day: complete retention Ba in 5 hrs.

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* First stool on 5th day.

distended, edematous intestinal loops. (3) Partial absorption may occur within the obstructed loops themselves. The evidence is incomplete and conflicting on this point; it is possible that all of these events occur at times. It is obvious that the persistence of a negative pyloric balance of considerable quantity (1 liter or more), for more than a few days, raises the probability of a mechanical obstruction of fibrous nature, no matter how satisfactory the decompression accomplished. Unorganized, plastic exudates resolve and, as extrinsic obstructing mechanisms, disappear in a few days. The presence of fibrous bands as the obstructing mechanism was accurately predicted in the patients whose progress is outlined in Tables 3, 4 and 6.

SUMMARY

In earlier publications the writer advanced the concept of "pyloric balance" and defined it as being the quantitative determination by continuous nasal catheter suction of the volume of fluid passing through the pylorus per unit of time and its direction of flow during various phases of ileus. The balance is termed "positive" when the predominating direction of flow is physiologic (i.e., from the stomach into the intestine) and "negative" when the direction of flow is the reverse. One may thus express in mathematical terms the varying function of the bowel during ileus.

The fact that many episodes of relatively complete obstruction are transient, whatever the original obstructing mechanism, and can be dealt with by continuous nasal catheter suction in properly selected cases, was enunciated by the writer in 1931. It was then made clear that the final obstructive mechanism (in the absence of peritonitis) was edema and spasm of the bowel, which often converted a chronic, incomplete obstruction into an acute, relatively complete one. The importance of intestinal tonus, rather than peristalsis, was stressed.

Further observations of the pyloric balance with obstructive mechanisms of various origins and at different levels in the small bowel are reported. They bear out the contention that useful information as to differential diagnosis and prognosis in ileus can be had from its behavior in the individual case. The information gained from these observations must be interpreted in conjunction with that gained from such other methods of examination, clinical and laboratory, of the patient as constitute a thorough evaluation of the patient with ileus.

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Omphalocele

DAVID KERSHNER, M.D., F.I.C.S.,*
I. CHARLES ZUCKERMAN, M.D., F.I.C.S.,** AND
LEON N. KESSLER, M.D.***
BROOKLYN, NEW YORK

SINCE the first description of omphalocele by Abroise Paré in 1634, more than 400 cases of this congenital anomaly are found in the medical literature. The variations in the number of reported cases, encountered by any reviewer of the subject, must be attributed to the difficulties besetting the collector, who must comb the literature for reports under an imposing multiplicity of synonyms employed by their authors in lieu of the term "omphalocele." Among the more frequently found synonyms are congenital umbilical hernia, amniotic hernia, exomphalos, funicular hernia of the umbilicus, ectopia viscerum, amniocele, hernia into the umbilical cord and umbilical eventration.[1] Within the strictest meaning of the word "hernia," a term which implies that the viscera found in the sac have at some previous time been lodged in the abdominal cavity, several of these synonyms are improperly applied, for some of the viscera customarily found in the sac have never been in the abdominal cavity. More precisely defined, an omphalocele is a congenital condition of the newborn, in which various viscera or portions of viscera are found enclosed in a thin-walled sac within the base of the umbilical cord, the fundus of the sac being covered by amniotic membrane, and the neck of the sac surrounded by the skin of the abdominal wall. The neck of the sac is the opening in the abdominal wall, which in a normally developed newborn would narrow itself into the umbilical ring. The fact that the omphalocele sac is covered by amniotic membrane, and not skin, distinguishes this anomaly from a true umbilical hernia.

A proper understanding of the nature of omphalocele depends in a large measure on a knowledge of the embryonal development of the celom and the intestinal tract. During the 12–24 mm. stage of the human embryo, corresponding roughly to the sixth to eighth week, as a result of the comparatively greater growth of the embryonic intestine and liver than the abdominal cavity, the intestine is thrown into a loop opposite the point of attachment of the yolk stalk. As this process of relatively unequal growth continues, the cephalic limb of the loop folds to the right and the caudal limb to the left. This same inequality in growth with its crowding of the viscera results in a transient protrusion of the intestine through the umbilical orifice into an expansion of the celom formed in the proximal part of the umbilical cord (Fig. 1). At about the 40 mm. stage (twelfth week), the intestine returns to the abdomen, when the abdomen enlarges at an accelerated rate. In this return to the celom, the omphalomesenteric artery (future superior mesenteric artery) is an important structure, for in its fixed position it acts as an axis for the retraction of the intestine from the umbilical celom. Following the return of the temporarily debouched intestine to the abdominal wall cavity, the umbilical celom becomes gradually obliterated by an increase of the mesoderm of the body stalk. This mesoderm constitutes the Wharton's jelly of the fetal umbilical cord.[7] One more embryologic observation need be added to account for the various theories of the genesis of this anomaly. Normally, the linea alba closes the abdominal cavity first from the pubis to the umbilicus, and then from the xiphoid to the umbilicus. This would predicate that any defects that result from imperfect closure of the abdominal wall, would occur craniad to the umbilical orifice, a supposition that clinical experience has tended to confirm.[3, 4]

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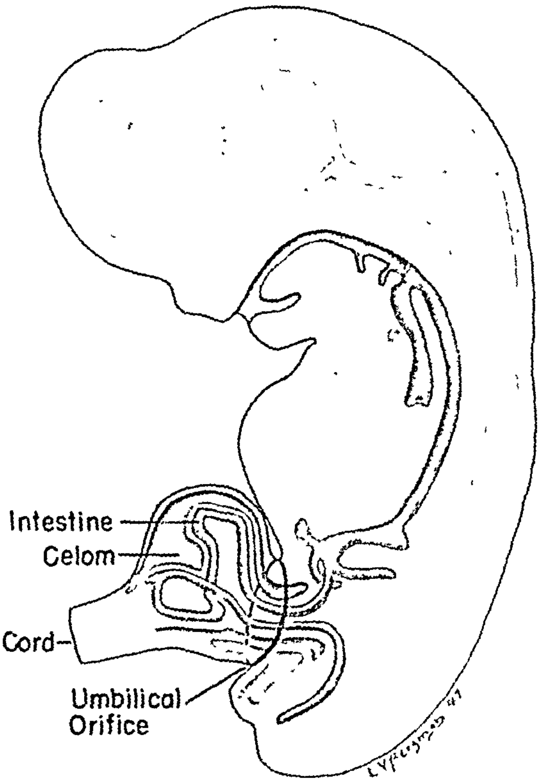
* Attending Surgeon, Beth-El Hospital; Attending Surgeon, Jewish Sanitarium & Hospital for Chronic Diseases; Associate Attending Surgeon, Cumberland Hospital.

** Associate Attending Surgeon, Beth-El Hospital; Clinical Assistant Surgeon, Cumberland Hospital.

*** Assistant Attending Surgeon, Beth-El Hospital; Assistant Attending Surgeon, Jewish Sanitarium & Hospital for Chronic Diseases.



A 17-mm. human embryo (from Mall and). Protrusion of intestine through umbilical into expansion of celom in proximal part of umbilical cord.

Based on the two observations of the extracelomic loop of mid-gut, and the method of closure of the anterior abdominal wall, numerous speculations on the genesis of omphalocele have arisen. Several are here enumerated:

1.—Con- [illegible] with Mall's observation that ex-
trusion of t [illegible] ne into the celom is preceded
by rapid devel [illegible] f the intestine and liver.
the assumption t [illegible] is a discrepancy in
opment of the a [illegible] wall and its conten
early normal [illegible] process, in whi
es fail to [illegible] passu with t
contents, [illegible] fficient int
[illegible] are fo

concept that the extruded intestine is withdrawn into the celom by the contraction of the longitudinal smooth muscle fibers of the omphalomesenteric artery. Any disturbance in this action would result in nonretraction of the intestine. This view likewise fails to account for the frequent presence in the omphalocele sac of the liver and other viscera developing from the gastroduodenal loop, which is not subject to pull from the omphalomesenteric artery.

4.—The occurrence of factors which hinder or prevent the normal return of the extracelomic intestine into the abdominal cavity has been advanced as an explanation. Among these factors may be mentioned the following:[11] (a) persistence of the fetal concavity of the dorsal spine; (b) arrest in development of the primitive vertebras; (c) persistence of the omphalomesenteric duct. Persistent yolk stalks or their remains are more frequently found in newborns with omphalocele than they are in normal newborns. This has suggested the possibility that the intestine is prevented from returning into the abdominal cavity by the persistent omphalomesenteric duct or its remains.[9] (d) Presence of fetal peritonitis.

5.—Careful embryologic studies have convinced many observers that omphalocele is caused by a failure of union of the mesodermal transverse septum with its amniotic covering, or to a failure in proliferation of embryonal connective tissue in the transverse septum, processes in the third week of embryonal development which normally lead to the formation of the supra-umbilical part of the abdominal wall.[4, 12, 13, 14]

Evaluation of the evidence leads to the conclusion that probably there exists some disproportion between the debouched viscera and the abdominal cavity which prevents the
ormal retraction of the intestine into the
dominal cavity; and that this disproportion
the result of some retardation in the de-
pment of the abdominal wall. This pri-
y underlying mechanism may be modified
e other factors mentioned. Occasionally,
though the viscera have returned to their
l place in the abdominal cavity, the
lomic pouch of peritoneum may fail to

eported incidence of omphalocele in
ge series varies from 1:5,000 to
newborns,[3, 4, 6] and although most
have noted an equal frequency in
d females. Specht and Shryock[5] have

claimed that there is a predilection for the male sex, the incidence being twice as great as in females. Most of the reported cases have been observed in full term newborns. Occasionally, the condition has been found in prematures and overterm babies, but never in excess of the statistics for the incidence of premature or overterm infants. Although most infants with omphalocele are normal in other respects, the presence of associated anomalies is sufficiently frequent to merit a word in passing. Commonly seen among these imperfections are harelip, cleft palate, clubfoot, Meckel's diverticulum, inguinal hernia, undescended testes, imperforate anus, visceral transposition, hydrocephalus, spina bifida, meningocele, exstrophy of the bladder, and vesical fistula.[15]

When first seen after birth, the infant with an omphalocele presents a startling and unforgettable picture. Protruding from the abdominal wall in the vicinity of the umbilicus is a transparent or translucent sac varying in size from a few centimeters to as many as 15 cm. in diameter, and averaging about 6–8 cm. Although the usual thickness of the sac is less than 1 mm., it may at times be so delicate, that during delivery it may burst, with the result that the infant's viscera may present through the rent in the membrane. Through this sac, as through a hazy window pane, can be seen the abdominal organs within. Attached to the inferior edge, or the summit of the sac, is the umbilical cord with its vessels, the two umbilical arteries and the umbilical vein separating and running between the layers of the sac to enter the abdomen. The vessels usually run inferolaterally, although occasionally, if the umbilical vein is displaced upwards, it runs superiorly over the sac contents. When first seen after delivery, the sac is moist and pliable, and although on gross inspection it may appear to be one fused membrane, in reality it consists of an outer layer of amniotic membrane, a middle layer of Wharton's jelly and an inner layer of extracelomic peritoneum (Figs. 2 and 3). In rare cases there is no peritoneal layer, the peritoneum stopping at the umbilical ring. Because of its poor vascularity, dehydration of the sac sets in within a short time (12–24 hours), and it becomes, in rapid succession, opaque, dry, friable and even black and necrotic in areas. It may crack or rupture with the slightest manipulation and eventuate in evisceration and peritonitis. Even if the sac is not ruptured, its poor vascularity makes it extremely vulnerable to infection, with resulting cellulitis involving the abdominal wall around the margins of the sac and ending as an abdominal wall cellulitis. The size of the omphalocele sac and its contents bears no direct relationship to the abdominal wall and fascial defect, which generally measures from 4–10 cm. in diameter. Most commonly, the skin of the abdominal wall stops abruptly at the base of the sac, but it may continue onto the wall of the sac for a variable distance of a centimeter or more.

The sac contents consist almost always of loops of small intestine. Rarely is any other viscus encountered without the simultaneous presence of a few coils of small intestine. Fairly frequently found is the proximal colon, and in one third of cases, the transverse colon. In half of the reported cases, some portion of the liver was contained in the sac and in one quarter of the cases, all of the liver was present in the sac. Other viscera reported found in the sac are the stomach, spleen, pancreas, urinary bladder, uterus, ovary and Meckel's diverticulum.

Although diagnosis of the average case of omphalocele is evident at first glance, there are extremely mild cases in which the sac and its contents are so small that the obstetrician, in his treatment of the umbilical cord, must be careful not to include them in his clamping. Such an accident would result in either severance of a piece of gut, with development of an intestinal fistula, or ligation of a piece of intestine with resulting obstruction.

For a short time, the omphalocele sac acts as a fairly efficient substitute for the abdominal cavity. The neck of the sac at the umbilical orifice is usually sufficiently wide to preclude obstruction and strangulation of the sac contents. Moreover, although the sac wall is thin, there appear to be no great alterations in physiology resulting from possible variations in temperature to which the extruded viscera are exposed. Even in those

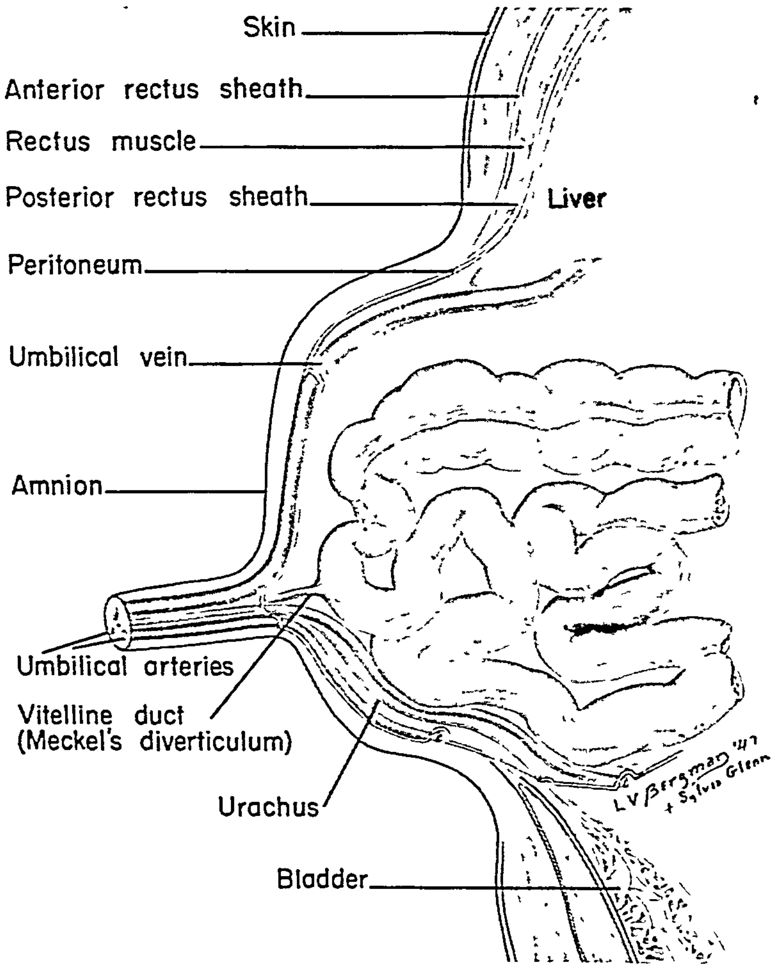


Fig. 2. Mesial section of omphalocele.

cases in which the entire liver is in the sac, despite the great tension put on the biliary passages, there is no biliary obstruction and consequently no jaundice. Respiratory embarrassment is not encountered, and all in all the infant is fairly comfortable. However, after the first 12 hours, when as result of sac dehydration necrosis and infection set in, the clinical picture changes.

In treatment of omphalocele, conservative or radical measures may be instituted. In rare instances where the sac and fascial defects are small, the sac contents may return into the abdominal cavity and the defect seal [illegible] with granulations. Again, where [illegible] small, or in larger sacs and defects [illegible] reason or other radical surgery is contraindicated, the conservative [illegible] by Ahlfeld may be employed. This method consists essentially of cleansing the sac and surrounding skin, reducing the sac contents to as great a degree as possible under a light narcosis, and then applying alcohol compresses covered by a bandage or by strapping. The procedure of choice is, however, radical surgery, performed within six hours after delivery. At this time the contents of the infant's intestines are sterile and negligible in quantity. Preoperative feeding is contraindicated. The resulting distention of the stomach and intestine with food and gas will make the operative procedure more difficult.

Choice of anesthesia for surgery depends on personal preferences. Many successful cases have been reported with no anesthesia at all. Most writers, however, are inclined to use either local infiltration of 1 per cent

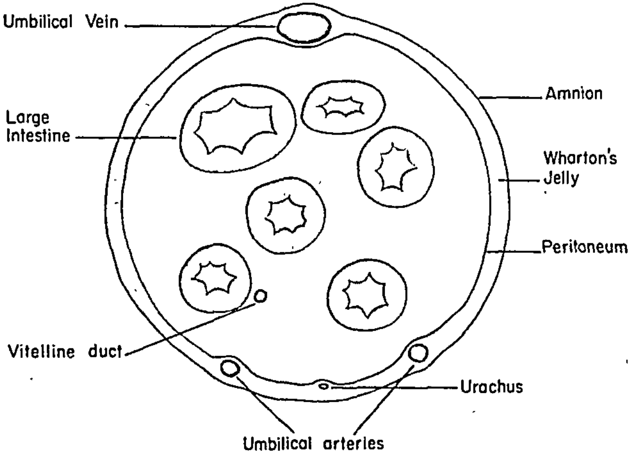


Fig. 3. Schema of cross-section of omphalocele sac and contents.

novocaine, or general anesthesia. We much prefer open drop ether. Very little is required and infants tolerate it well. It is less time-consuming, and necessitates less manipulation than is required as a result of the pushing, straining and repositing of gut with local novocaine infiltration.

Any type of radical surgery must concern itself with three considerations: (1) excision of the sac; (2) reposition of the debouched viscera into the abdomen, and (3) repair of the abdominal defect.

The choice of operative procedure will of necessity be governed by the quantity and nature of the viscera in the sac, the size of the abdominal cavity into which the extruded viscera are to be reposited and the size of the abdominal defect and the nature of the tissues to be used in repair. Where the abdominal cavity has not developed to a sufficient degree to accommodate the extruded viscera, great difficulty will be met in reposition without crowding, and where the defect is very great, insufficient tissue will render the repair difficult and inadequate. The ideal operation will therefore consist of an incision on the skin a short distance below the junction of the sac and the abdominal wall down to the peritoneum, which is opened and the sac excised. The umbilical vessels encountered are ligated and cut. The viscera are replaced into the abdominal cavity, and an attempt is made to free the muscle and fascial edges around the defect. If this is possible, then a layer by layer repair may be done, closing peritoneum and posterior rectus sheath together, approximating the rectus muscles and overlapping the anterior rectus sheath. Either absorbable or nonabsorbable suture material may be used in the repair. If such an ideal repair is not possible, a through-and-through, purse-string suture, including all the layers of the abdominal wall, may be employed. When it appears to the operator that a closure of all the layers of the abdominal wall will result in crowding of the viscera, only the skin and subcutaneous tissue should be closed, leaving the secondary repair of the umbilical hernia for some future time. A few points relative to the reposition of the viscera may be mentioned. The extruded viscera should be reposited in as correctly [illegible] anatomic position as poss [illegible] hen present in the sac, [illegible]

Any adhesions are easily separated, except adhesions between the liver and the sac. The severance of such adhesions may lead to extensive bleeding and can be avoided by replacing the liver and the attached portion of sac into the abdominal cavity, a procedure which has been used with no unfavorable sequelae. Where difficulty in replacing the liver is encountered, the method advocated by Freshman[3] may be employed. The liver is wrapped in a warm moist swab and squeezed for a few moments. This results in diminution in size, making its reposition easier.

As a general rule, postoperative complications occur within 12–36 hours and are the result of overcrowding of the abdominal viscera. They usually manifest themselves in three ways: (1) obstruction from pressure on the intestines; (2) cyanosis and respiratory embarrassment from upward displacement of the diaphragm as a result of increased intra-abdominal pressure, and (3) edema of the legs and circulatory collapse following pressure on the inferior vena cava, which impairs the return blood flow to the heart.

The unoperated child with an omphalocele will die either of cellulitis of the abdominal wall or of rupture of the sac and peritonitis, complications which set in as a result of dehydration and necrosis of the sac. The operated infant, if it survives the first 48 postoperative hours, has a good prognosis. There are several factors which may influence this prognosis.

1. Infection: infected cases offer a poor prognosis as compared to uninfected cases.

2. Time of operation: the longer the interval between birth and operative intervention, the poorer the prognosis, because of the changes which take place in the sac.[16]

3. Size of sac: other factors being equal, the survival rate is inversely proportionate to the size of the sac. The statistics compiled by Gross and Blodgett[2] demonstrate this:

Sac less than 5 cm. in diameter: 75 per cent survival
Sac 5-8 cm. in diameter: 28 per cent survival
Sac larger than 8 cm. in diameter: 17 per cent survival

4. Nature of viscera in sac: the prognosis is good if only intestine is present in the sac, but it is bad if liver is found in the sac. The presence of liver indicates inadequate intra-abdominal room for reposition of viscera, resulting in difficult replacement and intra-abdominal overcrowding.

5. Size of abdominal defect: the greater the defect, the more difficult the closure, resulting in increased intra-abdominal pressure and the sequelae of overcrowding.

A few statistics will serve to indicate the mortality rates in operated cases of omphalocele.

Author	Number of Cases	Survival Rate
Gross and Blodgett[2]..	20	50%
Alder[16]	72	Operation within 24 hours: 88% Operation after 48 hours: 34%
Aribat[17]	68	69%
Altpeter[18]	91	76%

CASE REPORTS

Case 1.—(No. 157,744) Baby S., born Feb. 2, 1946. The child was a full term male, 20 in. long, weighing 6 lb. 3 oz. Delivery was normal and spontaneous. The mother had one previous normal child. Physical examination of the newborn revealed a full term male child with mongoloid facies. There was a supra-umbilical omphalocele with a fairly transparent sac, through which coils of intestine could be readily seen. The sac was 10 cm. long, soft and pliable. The neck of the sac was 4 cm. in diameter, with the skin of the abdominal wall stopping abruptly at the base of the sac. There was meconium in the rectum.

Operation was performed 2½ hours after birth. Under open drop ether anesthesia, a circumumbilical incision was made down to the peritoneum. The sac was opened and found to contain practically the entire small intestine, the cecum, appendix, ascending colon and a portion of the transverse colon (that portion of the gastrointestinal tract supplied by the superior mesenteric artery). There was a firm vitelline duct attached to the ileum, close to the cecum and fixed at the neck of the sac. The umbilical vessels were not completely obliterated. These were ligated and cut. The urachal stalk, which was obliterated, was ligated and cut. The persistent vitelline duct was ligated and cut close to the gut and the end inverted with a serosal purse-string suture. The herniated viscera were carefully and anatomically reposited into the abdominal cavity, and the peritoneum was closed with purse-string sutures, using No. 1 plain catgut. The rectus muscles were coapted, and the anterior rectus sheath overlapped with three interrupted No. 1 chromic mattress sutures. The skin was closed with black silk.

The child made an uneventful recovery. There was no interruption of the regular feeding schedule. He was discharged eight days after operation with the wound well healed. His weight was 6 lb. 4 oz., 1 oz. more than his birth weight. At the time of writing, his condition is good, but he is a definite mongoloid type. There are no other congenital anomalies.

Case 2.—(No. 122,546) Baby K., born June 17, 1942. The child was a full term male, 21 in. long, weighing 7 lb. 2 oz. Delivery was normal and spontaneous. The mother had had no previous children. Physical examination of the newborn revealed an otherwise normal infant with an omphalocele. The sac extended into the jelly of the cord for 5 cm., and intestinal coils could be seen through the sac. The neck of the sac was 3½ cm. wide, and the skin ended abruptly at the base. The contents of the sac could be reduced by gentle taxis and held in place by inserting a finger through the abdominal defect. However, with the first cry of the infant, the herniation recurred. A gauze pad was therefore strapped over the defect to maintain reduction. It was felt that a slight delay in this case would not jeopardize the prognosis of this infant, and would allow for some preoperative preparation. He was operated on under open drop ether 27 hours after birth. An elliptical incision was made circumumbilically down to the peritoneum, and the sac was opened. It contained loops of ileum, cecum, appendix, ascending and transverse colon, as well as a patent urachus. The loops of ileum could be readily reduced, but the ascending and transverse colon were adherent to the dome of the sac, and had to be mobilized by sharp dissection. The viscera were anatomically reposited. The urachus was ligated and cut close to the bladder, and the stump inverted with a purse-string suture. The patent umbilical vessels were ligated and cut. The sac and cord were excised at the neck. The peritoneum and the posterior rectus sheath were closed with a running suture of plain No. 1 catgut. The rectus muscles were coapted, and the anterior rectus sheath was overlapped with interrupted chromic No. 1 mattress sutures. The skin was closed with black silk.

Recovery was uneventful, and there was no interruption of the feeding schedule. He was discharged 12 days after operation with a well healed wound and weighing 7 lb. At this writing he is a normal healthy boy of five years. His abdominal wall is firm, and there is no evidence of a hernia.

SUMMARY

Two cases of omphalocele are reported. In a 10 year period (1936–1945 inclusive), during which 20,577 newborns were delivered at this institution, only two cases of omphalocele have been seen. Both infants had associated anomalies.

The embryogenesis has been discussed, and the most plausible theories of the mechanism of causation of omphalocele are stressed.

Diagnosis, treatment, postoperative complications and mortality statistics are reviewed.

SOMMAIRE

Deux cas d'omphalocèle sont étudiés. Durant un période de dix ans (1936–1945 inclus), il y eut à notre hôpital 20,577 naissances. On ne rencontra que deux cas d'omphalocèle. Les deux enfants présentaient d'autres anomalies.

L'embryogénèse est discutée et les théories les plus plausibles du mécanisme de causation d'omphalocèle sont étudiées.

Il est passé en revue le diagnostic, le traitement, les complications post-opératoires et les statistiques de mortalité.

SUMARIO

Los autores reportan dos casos de onfalocele que ocurrieron entre 20,577 recien nacidos, en un periodo de 10 anos. Tambien discuten la ontogenesia de esta anomalia y las teorias que han sido avanzadas para explicarla; y hacen una revista de los metodos de diagnostico, tratamiento operatorio, asi como de las complicaciones y mortalidad de dicho tratamiento.

SOMMARIO

Gli AA. descrivono due casi di onfalocele occorsi in un periodo di dieci anni, comprendente 20,577 nascite. In ambedue i casi esistevano altre anomalie. L'articolo discute le teorie piu' plausibili sulla patogenesi dell'onfalocele.

Riassume la diagnosi, il trattamento chirurgico, le [illegible] postoperatorie e [illegible]

(Con[illegible] 109)

Abdominal "Epilepsy"

A Case Report

MARK M. SCHAPIRO, M.D., M.S., A.I.C.S.
CHICAGO, ILLINOIS

RECENTLY, Moore[1] called attention to paroxysmal abdominal pain as a form of symptomatic epilepsy. He emphasized the number of such undiagnosed cases which undergo repeated surgical operations with no relief. Usually such patients are seen in the early hours of the morning, as emergencies. The majority, fortunately, show definite lesions to explain the complaint and abdominal pain. It is those few scattered cases of abdominal pain, with no obvious lesions, which tax our ingenuity. We agree with Moore and others that all cases of so-called unexplained abdominal pain must have some rational explanation. Even if the patient has been subjected to surgery, further study should be made, eventually reaching a correct diagnosis.

We wish to present an additional case of abdominal epilepsy for consideration. Our patient had a definitely interesting diagnostic problem because of the multiplicity of her symptoms as well as because of the various manipulative procedures to which she had been subjected in the past. As a result of these previous procedures, there was sufficient cause for her present complaints; but the fact that there had been absolutely no relief following either operative procedure, forced us to look elsewhere for the basis of her complaints. The final diagnosis was not made until several months had elapsed and after every effort to relieve the symptoms medically had failed. Repeated examinations and detailed laboratory studies as well as psychotherapy had failed to solve the problem, until close comparison of her history, symptoms and manifestations with those described by Moore and others finally gave a clue to the difficulty.

CASE REPORT

P. F. A., white female, 24, was seen at 2:30 A.M. October 21, 1945, in moderate degree of [illegible] with cold and clammy skin. She was definitely [illegible] ill. Her husband gave the history of an onset of low abdominal pain associated with nausea and vomiting of 24 hours duration. The pain began as a sharp, twisting sensation in the lower abdomen radiating into the region of the diaphragm and associated with a heavy feeling in the "pit of the stomach." There was spasmodic vomiting of a bitter-tasting, greenish material which gradually became watery, of brown color and foul smelling. The attack had been preceded by several hours by a sense of constriction of the throat, thickening of the speech and marked salivation. There was no loss of consciousness, although there was considerable vertigo, dizziness and a "sense of floating in the air." The abdomen was bloated, and there was passage of frequent watery stools without blood or mucus.

On examination at this time the abdomen was not markedly distended, but was dome-shaped from the umbilicus to the symphysis with obliteration of the navel. It was tense, rigid and exquisitely tender. The patient could not find a comfortable position. Temperature was 97.6; pulse, 120; respirations, 28; blood pressure, 98/42. The abdomen was silent. Vaginal examination was not performed.

The only information elicited at this time was that several years previously she had undergone a partial bowel resection for obstruction. In view of her serious condition and dehydration, immediate surgery was deemed inadvisable. She was placed in Trendelenburg position, with ice bags to the abdomen, heavy sedation, prostigmine intramuscularly and fluids intravenously. Although the general toxicity of the patient improved during the next 24 hours, there was absolutely no cessation of the pain, nausea or vomiting. Exploratory laparotomy was performed with diagnosis of intestinal obstruction, acute recurrent.

Under pentothal sodium-ether anesthesia, the old mid-line skin incision was excised and the tissues exposed down to the peritoneum. All were markedly thickened, tough and quite inflamed. The peritoneum itself was about ¼ in. thick, purplish in color, dull and adherent to many loops of small bowel. A small opening was made just below the umbilicus to admit the index finger of the left hand. There was a sudden gush of clear, odorless and colorless fluid under marked pressure. As the opening was enlarged, more fluid was obtained, followed by loops of small bowel, markedly distended. In all, about 2,000 cc. of fluid were obtained. *Exploration of the abdomen revealed a markedly* distended small bowel extending from the jejunum to the ileum, with contraction of the large bowel along the transverse and descending portions. The walls of the affected bowel were gangrenous in appearance, thin and generously studded with thin, yellowish gray plaques densely adherent to the bowel. The entire bowel was examined, but nothing other than some thin fibrous adhesions were found. There were no constrictions about the site of the old gastro-enterostomy. All adhesions were freed as far as practicable; the entire bowel was brought into the operative field and wrapped in sterile saline cloths. Further exploration was then performed. The gallbladder was not enlarged, contained no stones and was unobstructed. The liver was normal in size, *smooth and firm. In fact, other than a cystic* left ovary, about the size of a grapefruit, and a hard, nodular retrodisplaced uterus which was atrophic and infantile, no pathologic process could be found within the abdomen. Reexamination of the exteriorized bowel showed it to be viable in all portions, with return to normal color, disappearance of distention and return of motility. *In view of the associated peritonitis, a rubber drain* was placed in Douglas' pouch and a tissue drain below the site of the old gastro-enterostomy, closing the peritoneum and other tissues in routine fashion. Fluid from the abdomen was sent to the laboratory for examination. Bacteriologically, there was no growth nor was any growth obtained on animal inoculation. On gross appearance, the bowel simulated that found after *strangulation and obstruction, but in view of* the few adhesions, we were not satisfied with this as the causative factor.

Postoperatively the patient continued to receive prostigmine, narcotics and intravenous fluids. These were augmented by large doses of liver and thiamine chloride to combat a severe secondary anemia. At 3 A.M. of the second postoperative day, the patient was seized with a sudden sharp pain in the left chest followed by a spasm of coughing and the raising of coin-like sputum slightly tinged with blood. The severe chest pain was relieved with pantopon, but she continued to feel "weak and afraid." Considerable mucus accumulated in the throat was expectorated only with difficulty. Temperature was 103.2, pulse 104 and respirations 32. Her condition remained unchanged, with temperatures varying from 100.2–103.8; pulse from 100–120 and respirations from 22–48, for 72 hours. No relief was obtained from nasal oxygen. At 7:30 P.M. on the third postoperative day, a 10 cc. ampule of aminophylline *with 2 cc. of caffeine sodium benzoate and 2 cc.* digifoline, was given intravenously; within 30 minutes, she expectorated a large frothy, blood-tinged clot of mucus. The patient stated that immediately thereafter she felt better. Identical medication was continued for 72 hours (every 6 hours) with considerable relief and a rapid disappearance of all symptoms. She was now urinating freely, having good frequent bowel movements, free passage of gas and was taking soft foods by mouth. On the fifth postoperative day, the drains were removed and on the sixth, all sutures. A bridge was placed at the lower margin of the wound where the tube drain had been located.

On the ninth postoperative day, the patient complained that she felt extremely nervous, had *a peculiar tight feeling in her stomach, marked* tightness (suggesting trismus) about the mouth and in throat with profuse salivation. She complained constantly of feeling dizzy, giddy and that she "seemed to be floating in air." In fact, she stated that her symptoms were exactly those which had preceded her present attack of abdominal pain; within 24 hours, such an attack *occurred. Sedation of all forms was instituted,* amytal and pentothal intravenously included, as we felt that there might be a hysterical factor involved at this stage. Within another 12 hours nausea, vomiting and watery diarrhea were as marked as prior to the surgical intervention. Complicating further diagnosis at this time was the fact that the menstrual period of the patient was due; we attributed all her complaints to this *factor. All medical attempts to induce menstruation* totally failed.

On Nov. 4, the night nurse observed that the patient was extremely restless, sleeping only at intervals, and with constant generalized twitchings of the body, more marked in the extremities. On Nov. 6, 5 days after onset of the second attack, vaginal examination revealed a tense, bulging, tender Douglas' pouch, with a large semisolid mass in the region of the left ovary. This was about the size of a football, not movable and seemingly adherent to the uterus, which was hard, fixed and markedly retroflexed. The diagnostic problem was thoroughly discussed with both patient and husband. The patient was quite apprehensive that she would be considered a hypochondriac, psychopath or pathologic liar, but the physical findings of pathology were present, although not of sufficient degree to warrant her marked symptomatology. Repetition of physical examination, resurvey from a laboratory angle as well as competent neurologic and otolaryngologic study, added nothing.

On Nov. 7, the patient was again operated on. Another midline incision was made, all adhesions freed and the peritoneum opened. No fluid, plaques or flecks were found. The peritoneum was pink, smooth and glistening. The bowel wall was firm; the bowel itself actively motile and of normal color; no adhesions were found in any portion. The left ovary was about the size of a football, multiloculated and hanging twisted in Douglas' pouch. It was firmly adherent to the uterus, which was flexed acutely backwards, hard as stone and markedly sclerotic. It was amputated supracervically with the left tube and left ovary. Complete exploration of the abdomen revealed no further gross abnormality. The abdomen was closed from below upwards in routine fashion, without drains. Pathologic studies on the specimens showed a nonsecretory endometrium, with marked atrophy of the uterine structure. There was complete destruction of ovarian tissue with changes suggesting cystic degeneration. (We suspected that the fluid encountered during the first operation might have been the result of a spontaneous rupture of a portion of a cyst with closure of the opening and refilling.)

Postoperative care was identical to that instituted previously with the added precaution of using coramine and digifoline in the hope of preventing any pulmonary complications. In spite of these precautions, 48 hours postoperatively, the patient again had difficulty in breathing, complained of itching over the entire body and became quite apprehensive and anxious, manifesting all the symptoms of her previous state with the added factor of what might be called pseudoconvulsions. During this episode she shook all over, thrashing arms and legs about in endless motion and salivating profusely. This lasted about 1 minute. Similar treatment was instituted with complete recovery in 48 hours. As before, the sutures were removed on the fifth postoperative day, and she was discharged nine days later apparently in good health.

At the time of discharge, we felt that the patient was in excellent condition, would be free of complaints and except for continued treatment of her secondary anemia, would require no further attention. Her diet was ample (high [illegible]), but of a modified bland [illegible] smoking and to avoid alcohol. Outside of continuing injections of liver and thiamine chloride twice a week, no other medication was given.

Three weeks to the day after discharge, we were again called to see her at home. The complaints were identical to those previously stated. In addition, her husband gave the information that for several days preceding the present attack, he had been awakened from his sleep to find her in the throes of generalized convulsions. These were accompanied by marked movements of both upper and lower extremities, slight arching of the back and profuse salivation. During the day there were no convulsions, but she stated that she was dizzy, had considerable vertigo and total blindness. The abdominal pain was intense, accompanied by nausea and vomiting as well as passage of frequent watery stools.

It was obvious that the patient was suffering from the same complaints for which we had performed two major operations, but now we faced the problem of diagnosis, since further surgery was out of the question. In addition, we felt that something drastic had to be done in order to restore her mental stability, her confidence and her marital tranquility. Another complete history was taken (in her own words); all laboratory examinations were repeated and she was examined by a competent neurologist and otolaryngologist. The only procedure not performed was an electro-encephalogram. It was during this period that Moore's paper appeared in the literature—comparison between his case reports and our patient gave the clue to the etiology of the complaints.

Our patient is a college graduate, with a master's degree in psychology. The story of her life makes a fascinating history and for "one so young she had already gone through several lifetimes of trouble,"[2] which bear directly on the diagnosis. Unfortunately, we had not given sufficient attention to the details of her history and thus were unable to appreciate the points that might have enabled us to make a diagnosis earlier. In view of the importance of the past history and events in making this diagnosis, we wish to present the story of our patient in some detail.

The history of similar attacks of pain can be traced to onset at the age of 11, following serious illnesses, including smallpox, mumps and scarlet fever. During the first attack, which occurred in the midst of an epidemic of poliomyelitis in California, this disease was suspected, but final diagnosis was chronic appendicitis. Another identical episode occurred at the age of 13. At the age of 17, there was recurrence of the typical abdominal pains, more marked in severity and associated with profuse vaginal bleeding. Diagnosis was acute exacerbation of chronic appendicitis. Surgery performed at this time included appendectomy, right oophorectomy and suspension of the uterus. No data are available as to pathologic findings, but the patient was told that her uterus was infantile and badly retroflexed; she was advised against pregnancy. During this illness, she developed a sensitivity to sulfa products. Several months postoperatively, she again suffered from frequent and repeated episodes of abdominal pain, which were variously diagnosed as postoperative adhesions, intestinal influenza, a nonspecific gastro-enteritis, etc. All attacks were associated with, or preceded by, tightness in the throat, spasm of the diaphragm, salivation, diarrhea, etc. During her eighteenth year she suffered from these attacks every two or three months, was repeatedly admitted to the hospital with diagnosis varying from chronic constipation or ptomaine poisoning to allergy. At this time she was thoroughly studied roentgenologically, neurologically, psychologically and medically. All studies were reported as negative, and the patient was told that nothing could be done.

The patient married in her twentieth year, contracted gonorrhea from her husband and became pregnant two months later. Between conception and her seventh month of pregnancy she was hospitalized three times for abdominal pains; the last time diagnosis was premature labor. On admission to the hospital her condition became worse, with onset of nausea, vomiting and diarrhea. The pain rapidly spread over the entire abdomen, with distention. In view of the rapid progression of symptoms, her attending physician made a diagnosis of acute bowel obstruction for which a partial bowel resection and posterior gastro-enterostomy were performed. She spontaneously went into labor 48 hours postoperatively, delivering after 40 hours a live male child, which died 5 hours later. During the prolonged labor and for 48 hours thereafter, the patient suffered from repeated generalized convulsions involving the entire body, with loss of control of all bodily functions. Convalescence was slow and prolonged.

Two months after discharge from the hospital, she again experienced attacks of intermittent abdominal pain associated with all the signs and symptoms described. Dizziness and loss of equilibrium were accentuated during this time, relief being obtained only when in the prone position. Following the last attack, she was seized with a sudden retro-orbital pain, shooting from one side to the other, with haziness of vision, blurring and diplopia. There was rapid onset of amnesia and paralysis of the entire right side of the body. This lasted for 3 days, during which time the patient was seen by neurologists, internists, ophthalmologists and psychiatrists. Only optic atrophy was found, and the cause of this could not be determined. (Visual difficulty is still present but has improved considerably under present therapy. Optic atrophy, bilateral, is still apparent, but we have not been able to determine the cause.)

During her twenty-second year, the patient was found to have albumin, pus and blood in the urine following another attack of pain, which, this time, was localized in the region of the right kidney. Complete urologic examination revealed no causative lesions; to date the patient occasionally shows traces of albumin in the urine.

On remarriage in her twenty-third year, she noticed that her attacks were aggravated, or precipitated by sexual relations. During her periods of distress, intercourse prolonged the attacks. In spite of total abstinence, the attacks recurred spontaneously after several months in identical form. During this time and up to the present writing, she has suffered four attacks, each accompanied by temporary loss of consciousness and partial amnesia of short duration.

In tracing back all possible etiologic factors, we discovered that after an attack of scarlet fever, at 11, she developed a severe albuminuria which lasted for several years. She has undergone three tonsillectomies and still shows excessive lymphoid tissue scattered throughout the mouth and oropharynx. At 14, she was subjected to a thyroidectomy. She had had an acute spasm of the throat, with inability to breath or swallow. The tissue removed was a hard, fibrous, nonmalignant growth about the size of a hen's egg which was reported as an atypical thyroid adenoma, non-toxic. Shortly thereafter, she fell from the roof of a four story building, fracturing the right ankle, spraining both wrists, lacerating the right knee and scalp. In her sixteenth, eighteenth and twentieth years, she was involved in various accidents in which she sustained injuries to the head, the extent and nature of which were undetermined.

Since early childhood, some time before onset of the abdominal complaints, she has been unable to maintain her balance with both eyes closed. She still is unable to stand or sit erect with eyes closed and tends to fall forward accompanied by a sensation of "floating slowly downward from a great height." This is relieved only when she lies flat. These sensations have been accompanied by involuntary spasmodic convulsions of the entire body, which tend to disappear when the patient finally falls asleep. A definite epileptic history can be obtained in one paternal first cousin, a paternal second cousin and a paternal uncle.

On Dec. 30 (approximately two months after original admission) she was placed on specific anticonvulsant therapy, diphenylhydantoin sodium, gr. 1½, twice a day with a bromide mixture four times a day. Within 48 hours there was noticeable improvement in her general condition, decrease of nervousness and diminution of the abdominal pain. After one week, she noticed that her entire attitude had improved: she was totally free from pain, dizziness and vertigo had subsided, vision had improved somewhat, and, in fact, she stated that she had never felt better in her life. Up to the present writing, she has gained 15 lb., has been completely free of symptoms in every respect (vision still slightly impaired), except for two periods of 48 hours each when she was taken off her medicine. During these two intervals pain returned, there was marked vertigo, etc.

COMMENT

This patient, studied intensively by all available methods, who had had all intrinsic diseases of the pelvic and abdominal viscera surgically removed and other conditions eliminated by thorough and competent studies and treatment, persisted in her manifestations of abdominal disease without localizing symptoms. After detailed study of her case history, we discovered data showing the possible existence of cerebral disease and dysfunction. The behavioristic occurrence of the pain adhered in most respects to the pattern of epilepsy suggested by Wilson.[3] The presence of associated epileptic phenomena preceding the attacks, salivation, tightness of throat and mouth, vertigo, dizziness and actual convulsions in several instances point to the etiology of the disease. Although to date, all available neurologic studies have been negative, the *condition* abdominal "epilepsy" cannot be ruled out. Finally, the salutary effect of anticonvulsant drugs, with recurrence of all signs and symptoms on cessation of the [illegible] establishes the therapeutic test of [illegible]. These facts are in accord with [illegible] for this diagnosis.

SUMMARY

The author describes in extreme detail the case of a young woman, who came under his observation while in her early twenties, with what at first appeared to be an acute attack of intestinal obstruction, together with a history of several sessions of major surgery in other places at an earlier time. When all routine and indicated procedures failed to relieve recurrent attacks of abdominal pain, with other generalized symptoms, a search of her entire life history, together with observation of the similarity of the case to published reports of Moore,[1] led to a diagnosis of abdominal epilepsy. When treatment based on this diagnosis was instituted, the patient was immediately relieved of most of her symptoms. It is especially significant that during two brief periods when medication was suspended, most of her symptoms returned in full force.

RÉSUMÉ

L'auteur décrit en détail le cas d'une jeune femme, d'une vingtaine d'anneés. Elle présentait des symptômes qui ferent croire à une obstruction intestinale. Elle avait anterieurement été operée, à différentes époques. Etant incapable de soulager par les procédés ordinaires les symptômes abdominaux, on fit une étude approfondie de la malade, de ses antécédents et on arriva à formuler le diagnostic d'epilepsie abdominale. Soumettant la malade à un traitement basé sur ce diagnostic, on obtint un soulagement immédiat de la plupart des ses symptômes. Supprimant pour dex courtes periodes le traitement antiépileptique, il y eut recidive des tous les symptômes abdominaux qui cédèrent aux médicaments antiépileptiques.

RIASSUNTO

L'autore descrive minutamente il caso di una giovane paziente la quale presentava a tutta prima i sintomi di un'ostruzione intestinale acuta, confermati, nell'anamnesi, dalla storia di numerosi interventi addominali. La diagnosi di epilessia addominale venne raggiunta solo dopo il fallimento di tutti i soliti procedimenti terapeutici, con uno studio accurato dell'anamnesi ed in base alla similarità

(Continued on page 109)

Sección en Español

Cerclaje Proteinico como Tratamiento dei Prolapso Rectal en el Adulto

AURELIA DIAZ UFANO, M.D., Y MIGUEL ANGEL CORTEZ, M.D.*
LIMA, PERU

ENGLISH SUMMARY

The authors present a detailed study of the anatomy of the anal region and discuss the etiology of rectal prolapse, followed by a description of their treatment, which they have named "Cerclaje proteinico." This treatment consists of the infiltration of the perirectal tissues, close to the rectal mucosa, with sterile milk. The needle is inserted clock-wise through the peri-anal skin and not through the rectal mucosa. Four injections are given at each session, and the results have, so far, been satisfactory.

NOS vamos a ocupar del tratamiento del prolapso rectal en el adulto por el cerclaje proteínico. Llamamos así este procedimiento por la gran similitud que ofrece con el cerclaje protéinico. En efecto si el número de sesiones fuera considerable, llegaríamos a aplicar en tantos puntos como minutos tiene la esfera de reloj, y en conjunto tendríamos un anillo fibroso, cuyo significado terapeutico sería el mismo que el de un aro de plata, de seda o xatgut.

Un Poco de Historia.—La idea inicial de que el prolapso pudiera curarse con inyecciones sobre el elemento contractil del ano-recto, data de una observación empírica hecha por nosotros, en un niño que nos sirvió para el examen de grado de la especialidad. Tenía una contractura espástica de los glúteos por una serie de inyecciones de quinoformo que le aplicaron en el curso de un proceso palúdico. Esta observación nos sugirió la idea de que por ese mecanismo y empleando sustancias que provocaran contractura permenente, pudiera reducirse y luego curarse el prolapso rectal. Acto seguido tuvimos oportunidad de tratar a un niño prolapsado, familiar de un distinguido jurisconsulto de Lima y con este criterio simplista aplicamos una serie de inyecciones de estricnina en la vecindad del ano, y vimos con gran sorpresa, que a partir de la cuara inyección no volvió a presentarse el prolapso. ¿Había actuado la estricnina como sustancia esclerosante o simplemente como un tónico muscular? Hoy podemos afirmar que lo único que se consiguió en aquel entonces fué provocar el dolor en el elemento contractil del recto del niño y simultáneamente tonificarlo, logrando su curación. Despues de varios años vimos al niño y continuaba en buenas condiciones.

Varios años depués, aproximadamente 5 o 6, en ocasión de hallarnos ya en el Departamento de Cirugía del Dr. Francisco Graña y bajo la tesonera y atinada orientación que el Jefe del Servicio, Dr. Aurelio Diaz Ufano imprime a nuestra labor diaria, continuamos nuestros estudios sobre Patología Quirúrgica del Aparato Digestivo y entonces tuvimos oportunidad de observar casos de prolapso rectal en el adulto.

Acudió inmediatamente a nuestra mente el recuerdo de la experiencia anterior y buscando literatura nos llamó de inmediato la atención no encontrar ni referencia referente al tratamiento del prolapso rectal del adulto por este procedimiento. Como las resecciones de prolapso y procidencia rectales constituyen operaciones de magnitud con copiosa pérdida de sangre y en que muchas veces hay que abrir el intestino y el Douglas, pensamos justificado el esfuerzo por encontrar procedimientos más sencillos e incruentos. Llegó a nuestro poder un folleto publicado por el Sr. Carlos Bazán: "Tratamiento Médico del Prolapso Rectal del Niño" y de él tomamos el dato de la sustancia empleada, leche esteril. Pero observamos también la imprecisión de los conceptos, pues en él no se llega a definir qué es un prolapso rectal. ni qué es una procidencia rectal, porque indistintamentese mensiona el prolapso queriendo indicar una procidencia, y viceversa, se menciona procidencia tratando de indicar un prolapso. Incluso. se admite como origen del prolapso rectal. la hernia del fondo de saco de Douglas.

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* Trabajo presentado al V Congreso Internacional del Colegio Internacional de Cirujanos, Lima, Peru. 23 de marzo de 1946.

A partir de estas nociones iniciamos nuestra experiencia de tratar el prolapso rectal del adulto. con inyecciones de leche esteril, aplicadas en puntos situados sobre un aro perirectal. procedimiento al que denominamos cerclaje proteínico por al similitud antes mencionada. con el cerclaje protéinico.

Aunque parezca supérfluo, consideramos necesario hacer un recorderis de la constitución anatómica del ano-recto. de manera especial de su musculatura propia. porque todas las modificaciones que se consigue con el procedimiento que preconizamos, hay que atribuir a este sistema muscular que. en cierto modo. es su armazón no sólo estético sino funcional, rol que primordialmente está a cargo del músculo esfinter externo.

El Recto es un órgano hueco, tubular, considerado como la última porción del intestino grueso y que se extiende desde la sínfisis sacroiliaca izquierda. según unos. y desde la tercera vértebra sacra según otros. hasta la línea ano-rectal.

Se le ha dividido para su estudio. de muy diferentes maneras: unos consideran una porción peritoneal y otra extraperitoneal; otros consideran una porción pélvica y otra perineal; otros. en fín lo consideran dividido en tres porciones correspondientes a cada una de las válvulas rectales.

Principiando por su musculatura de vecindad, la pared posterior del recto pélvico, está en relación a cada lado de la línea media, con las fibras de origen de los músculos pira- [illegible] abajo con el coxis y los músculos [illegible] elementos a los que está fijado [illegible] celular laxo.

[illegible] a derecha e izquierda, el recto [illegible] en relación con el músculo ele- [illegible]

[illegible] tiene gran importancia [illegible] del peritoneo, en el mo- [illegible] cara anterior pasa a la cara posterior de la vejiga, formando el saco recto-vesical, por ser el elemento quirúrgico de la reparación de los prolapsos del recto. Este elemento ha sido materia de detenido estudio por numerosos investigadores quienes han insistido en medir la distancia entre el ano y el punto declive de este saco, habiendo llegado a establecer que, cuando la vejiga y el recto están vacíos, la distancia entre ano y Douglas o fonda de saco recto-vesical, es de 6 centímetros, y cuando aquellos órganos están ocupados, alcanza a 8 y ½ centímetros. Esta determinación tiene particular importancia para el procedimiento qua preconizamos, porque nos permite conocer la profundidad hasta la que podemos introducir la sustancia fibrogénica y aun cuando para ellos siempre nos ceñimos a los elementos propios del ano-recto, es de todos modos un punto de referencia.

Aparte de estos elementos, están entre recto y fondo de vejiga los conductos deferentes, las vesículas seminales y una lámina célulo-muscular que arrancando de la aponeurosis perineal media, pasa por delante del recto para terminar en el fondo de saco recto-vesical. Como se comprende estos músculos forman parte del periné.

El recto en su porción perineal está practicamente rodeado de un enjambre de elementos musculares: en su cara posterior por los fasiculos posteriores del elevador del ano y parte posterior del esfinter externo. A los lados, por estos mismos músculos y por delante por las fibras del esfinter externo, del elevador del ano. del bulbocavernoso y transverso del periné; y esta misma cara en la mujer con las fibras del esfinter, del constrictor de la vajina y del transverso.

Este conjunto de músculos y fascículos musculares constituyen. por decir asi, los elementos activos periféricos.

El elementos activo intrínseco, elemento propio del recto, está constituido por esa túnica muscular a túnica *media de sus* elementos constitutivos. que consta de dos capas, una superficial de fibras longitudinales y otra profunda de fibras circulares.

Las fibras longitudinales, que no son sino continuación de las cintillas del cólon que a este nivel se ensanchan en forma de manguillo; siendo de notar como dato de importancia para el cerclaje protéinico, que no conserva un espesor uniforme, sino que es mais grueso en sus partes laterales. Otra circunstancia también importante es la distribución y dirección de las fibras de la porción media de este manguillo, es decir la comprendida entre las fibras longitudinales y las circulares. En efecto, esta porción viene a terminar en la parte inferior del recto y a este nivel se continúa directamente con las fibras del elevador del ano, con las que forma un asa de concavidad súpero-externa mientras que las fibras profundas vienen a fijarse en la cara profunda de la piel del ano y en el espesor de los esfínteres.

Este manguillo de músculos, cuya importancia es singular desde el punto de vista del tratamiento que preconizamos, a su paso por el periné recibe una serie de fibras de refuerzo: lateralmente, de las fibras internas del elevador del ano, que luego de unirse al manguillo descienden hasta el ano; por la cara posterior, fibras del retractor ani y por delante un fascículo procedente de la capa longitudinal de la uretra, detalle de suma importancia por las consecuencias que pudiera acarrear una fibrosis provocada a este nivel.

Las fibras circulares de la túnica media del recto, a semejanza de las longitudinales, no son sino continuación de las circulares del intestino grueso. Su importancia estriba en que en su porción inferior se engruesa para formar el esfinter interno, para formar, repito, juntamente con el esfinter externo, el cierre del orificio anal.

Aparte de lo descrito, las fibras circulares presentan ciertos engrosamientos, menores que el anterior pero que tienen so propia importancia: uno situado a 8 centímetros por encima del ano, es decir a una distancia que estaría abordable a nuestro procedimiento, es el esfinter descrito por Nélaton. Un segundo engrosamiento, del mismo valor que el anterior, es el descrito por Beirne.

Su importancia no se debe tanto a que pudieran funcionar siquiera aproximadamente como un esfinter contentivo, sino a que son fascículos más, que se suman a esta armazón contractil, base fundamental de nuestro procedimiento.

Sin embargo de lo hasta aquí espuesto, el elemento muscular de mayor importancia es el músculo esfinter externo, pues es éste el que principalmente mantiene la forma del conducto anal. Está constituido por dos órdenes de fibras, unas profundas las longitudinales y otras superficiales las circulares. Las primeras parten de la extremidad y cara posterior del coxis y rodeanal ano van a incertarse en el tendón central del periné. Las circulares son mas superficiales y rodean completamente el conducto anal.

Ligamentos.—Como quiera que tanto el prolapso como la procidencia rectal descensos o mejor dicho, desprendimientos de los propios elementos del ano-recto o de sus medios de fijación, es natural considerar la importancia que éstos últimos tienen.

Los medios de fijación o ligamentos del recto son:

El ano-coxígeo que en forma de cordón se extiende de la extremidad del coxis a la cara posterior de la unión ano-rectal, sirviendo al mismo tiempo de inserción a las fibras más superficiales del esfinter externo.

Los ligamentos laterales, que no son sino esas porciones de tejido conectivo que se le adhieren a nivel de los repliegues laterales del peritoneo.

Intencionalmente prescindimos de hacer el estudio del verdadero medio de fijación del recto, el mesorecto, o porción terminal del meso-sigma, por ser un elemento esencialmente quirúrgico y situado fuera del alcance de nuestro procedimiento.

Fosa Isquio-Rectal.—Aun cuando nuestra experiencia está circunscrita por hoy, a determinar la fibrosis de los elementos propios del recto, consideranos como otro medío donde actual, ese elemento conectivo y graso, situado a ambos lados del recto y que rellena la fosa isquio-rectal. Este tejido graso-conectivo, a la vez que individualmente, puede servir para los casos en que el procedimiento tenga que realizarse en ambos elementos, es decir para hacer procedimiento combinado de elementos propios del recto juntamente que el tejido de la fosa isquio-rectal; en efecto hay extrecha relación entre ambos elementos, es decir el conectivo grasoso de la fosa isquio-rectal está adosado a ambos lados del recto sirviéndole de soporte elástico.

Es facil suponer que en el adelgazamiento violento, a undirse la [illegible] esta fosa, el conectivo que de por sí es laxo, se haga sumamente distendible y pierda su papel de elemento de sostén.

PROLAPSO RECTAL

Y entrado en materia, establecemos de acuerdo con la mayoría de autores, la diferencia entre prolapso rectal y procidencia rectal.

Entendemos por prolapso rectal el descenso o desprendimiento de la capa mucosa del recto; y procidencia, de todos los elementos constitutivos del mosmo, incluída la capa serosa-peritoneal, comprendiendo bajo esta denominación también aquellos descensos puramente intrarectales es decir que no afloran el orificio anal.

Los prolapso rectales se dividen en grados según sus proporciones, estableciéndose la longitud de 2 centrímetros para el primer grado y de 2 a 4 para los de segundo grado. Esta división nos parece inoficiosa, pues no explica ningún hecho anatómico ni fisiológico. Es mas racional, anatómica y verdadera la clasificación a) prolapsos anales, b) prolapsos rectales y c) prolapsos ano-rectales.

Y de nuestra propia observación señalamos, sin pretender hacer clasificación, las siguientes variedades:

a) Prolapsos que se presentan al defecar.

b) Prolapsos que no se presentan en este momento y que para ello necesitan mayor esfuerzo.

c) Prolapsos que se presentan espontáneamente.

d) Prolapsos que se reducen con maniobras mas o menos dolorosas, y

e) Prolapsos que se reducen espontaneamente.

Una diferencia terapéutica que nos permite apreciar el significado patológico de prolapso y procidencia es que, mientras que para el prolapso se preconiza un sinnúmero de procedimientos: inyecciones esclerosantes, cauterizaciones, ligoduras, rectorrafías, cerclaje proteínico; para la procidencia, rectal el tratamiento es tan complejo e inseguro, habiéndose recurrido desde las pexias más simples, hasta las resecciones mutilantes y hasta aceptar como único tratamiento la colostomía inguinal [illegible]

Igual apreciación nos permite hacer la clasificación de los prolapsos en anales, rectales y ano-rectales, pues junto a esta clasificación las procidencias pueden ser rectales, sigmoideas y rectosigmoideas.

Una tercera consideración que nos permite mayor ilustración, es que el prolapso podemos considerarlo como el primer paso hacia la procidencia.

ETIOLOGIA

Como causas etiopatogénicas aseptamos factores cuya complejidad varía al infinito, estando a la cabeza de la lista, como es natural, todos aquellos procesos astenizantes, la hiponutrición, el adelgazamiento violento que determina la laxitud de los medios fascialmes de sosten del recto y del piso pelviano, acarreando la modificación de la estática de la cavidad pélvica y de todos los órganos que contiene. La hipotonía generalizada, los trastornos endocrinos, las afecciones nerviosas con trastornos del plexo sacro, tabes, mielitis, etc. Los hábitos, como son las posiciones defectuosas al defecar; esfuerzos exagerados en la constipación rebelde. Y también los esfuerzos fisiológicos del parto o los debidos a obstáculos al libre tránsito de la masa fecal, como son los tumores del aparato genital femenino, los úteros desviados, los tumores de la próstata, las ptosis viscerales. Y finalmente los hábitos de degeneración, la pederastía, etc. Como caso raro vamos a narrar un hecho presenciado por nosotros en un recluso en la Penitenciaria de Lima que una noche llamó para que se le atendiara de un cólico intestinal y cuando estuvo solo frente a nosotros, expresó que se le había introducido "una astillita en el recto"; al realizar el examen comprobamos que el ano presentaba una redordela carnosa, que así lo denominamos aquella vez porque aun no conocíamos un prolapso, y al centro un cuerpo extraño del tamaño de una moneda de 10 ctvs.

Reconstruyendo los hechos con los conocimientos actuales, habríamos pensado de inmediato en un prolapso rectal. Cual sería nuestra sorpresa cuando, con un poco de aceite de comer y con cierta paciencia, extrajimos del recto un madero, que en sus primeros 5 ctms. de extensión tenía un diámetro de 1½ cmts. Y en los restantes 20 cmts. un diámetro de 4 cmts. Es decir, en conjunto, tenía una longitud de 25 cmts. y una vez en nuestras manos la pieza obscena, pudimos hacer una sinopsis de la anatomía del pene, pues estaba tan perfectamente tallado que no le faltaba ni el pliegue balanoprepucial ni las venas dorsales, menos el mea urinario. Extraído este extraño cuerpo pornográfico, desapareció el cólico y juntamente el prolapso rectal.

Frecuencia.—Aunque la mayoría de los tratadistas consignan más frecuentes en los extremos de la vida, nuestra observación en su totalidad se refiere a personas de edad mediana. Explicamos este hecho, como debido a la desnutrición de nuestros obreros, factor N° 1 como determinante de la laxitud de los medios fasciales de sostén del recto; sumándose a esto el sistema de vida y sus ocupaciones profesionales: con choferes que permenecen sentados en el pescante o albañiles que tienen que levantar pesos considerables, hipoalimentados e hiponutridos en los que casi es regla un tercer factor, las lesiones inflamatorias, ya por la misma pobreza fisiológica que ostentan, y a por la falta de higiene y también por los hábitos.

No tenemos experiencia en pacientes viejos por la limitación de edad en los servicios hospitalarios de la C.N.SS. Pero es fácil comprender que si en la vejez la relajación de los tejidos es un fenómeno fisiológico, la regla sería la existencia del prolapso o de la procidencia. Sin embargo, la realidad es muy diferente y pensamos que el factor predisponiente siempre ha de ser de orden nosológico, pues por muy viejo que sea un individuo no se prolapsa sino por causas patalógicas.

Exploración del Recto.—Reviste especial importancia la exploración del ano-recto, para dar el verdadero nuombre a la anomalía patológica que estudiamos, por ser sumamente fácil la equivocación con multitud de procesos similares.

Consideramos de ascaso valor el interrogatorio del paciente si éste no tiene una relativa cultura, deducción hecha de nuestra experiencia en pacientes obreros, pues éste se concreta a manifestarnos que en el momento de defecar se les presenta un bultito mas o menos doloroso, sangrante o nó, que se reduce espontaneamente o que tiene que practicar ciertas maniobras para ello.

A guisa de anécdota tenemos que referir el caso del A. R., quien desde muchos meses antes de ingresar al servicio observaba que en el momento de defecar se le presentaba un bultito—expresión corriente en nuestros pacientes—y cada vez tenía que introducirlo con los dedos. El exceso de trabajo y otras circunstancias propias de los servicios hospitalzarios hicieron que por varios días aceptáramos como un supuesto prolapso del recto. Examinamos repetidas veces al paciente sin lograr visualizarlo ni con el máximo esfuerzo que hiciera, sólo se le presentaba en el momento de defecar. Encomendamos a un enfermero para que observara en ese momento y obtuvimos el informe de que efectivamente salía un tumor del tamaño de un huevo de paloma y que el paciente lo introducía con los dedos. ¿Era un prolapso? ¿Era un hemorroide? ¿Era un pólipo? Aceptamos esto último y lo llevamos a la sala de operaciones y grande fué nuestra sorpresa al ver que hasta una profundidad de 25 cmts. era un recto sano.

De inmediato concebimos la idea de un desprendimiento espontáneo del pólipo o que efectivamente existía un prolapso y que en ese momento anestésico y en la posición de Trendelenburgo no se presentaba.

Pero nuestra sorpresa iba de más en más, cuando el paciente nos manifiesta que en la deposición del dia siguiente volvió a presentarse el bultito. Entonces nos pusimos en acecho para practicar una ligadura y dejar un hilo largo prendido a la piel. Así lo hicimos, ''le echamos lazo'' según una feliz expresión del Prof. Graña, y luego lo llevamos a la mesa de operaciones y pudimos comprobar que el pólipo tenía un pedículo de 25 cmts. de largo y estaba implantado a una profundidad de 30 cmts. del ano. Lo resecamos al termocauterio en su punto de implantación y aquí terminó la tragedia del paciente.

Este hecho nos lleva a decir que la exploración del recto debe ser minuciosa y para esto queremos dejar establecido lo que vamos a llamar la:

Posición Ideal.—En los prolapsos que se presentan espontáneamente o en aquellos que no se reducen sino con maniobras, es claro que la inspección permite estudiar sus caracteres, pero no todos, porque ni es en la posición de costado o de Sims, ni en la proctológica, ni en la genu-pectoral se puede apreciar todo lo que se debe conocer de un prolapso. Si en la genu-pectoral, el peso de la masa intestinal impide apreciar el volumen del prolapso porque lo retrae; si en la posición de Sims o en la proctológica pasa lo propio.

Llamamos la posición ideal para examinar el prolapso rectal, la posición de cuclillas, la posición de defecar; para esto hacemos subir al paciente sobre la mesa de examen, naturalmente sobre una chata por si hubiese una descarga excrementicia. En esta posición le pedimos que haga esfuerzo y vemos que el prolapso se presenta en toda su proporción, longitud y volumen y si, como casi siempre sucede, en este momento se produce una defecación, se observa también al prolapso en su momento fisiológico y podemos constatar si hay o no hemorragias, si hay ulceraciones, etc.

Por las grandes ventajas que presenta esta posición, queremos nosotros llamarla la posición de prolapso, porque en esta posición se hacen presentes todas las variedades, incluso aquellos que se presentan sólo con los grandes esfuerzos, porque al esfuerzo que el paciente realiza se suma el peso de las masas intestinales y demás órganos del abdomen y pelvis, sobre el elemento prolapsado.

Tacto Rectal.—Es el procedimiento de exploración practicamos y aunque nuestro nombre de quirugos quiera decir "que vemos con los dedos" es éste uno de los casos en que la exploración digital da pocos datos, debido en primer lugar a la flacidez de los elementos ano-rectales que no presentan plano de resistencia sobre el cual constatar su consistencia, su dolor, su contenido, etc. Una ulceración no podemos descubrir al tacto rectal; un hemorroide interno no podemos catalogarlo como tal, puesto que se deprime dentro de su magma fláccido, la masacelulo-grasosa de la fosa isquirectal.

Si se trata de un prolapso intrarectal tampoco podremos catalogarlo puesto que muchos otros procesos pueden presentarse en la luz del recto, pólipos, tumores diversos, hemorroides [illegible] etc.

Sin embargo el tacto rectal tiene su importancia propia, porque permite constatar los caracteres del prolapso visible, para apreciar so consistencia, su espesor, sus adherencias, etc. Y si se trata de mujeres esta importancia es mayor porque entonces hay que descubrir otros datos: se puede descubrir la participación que en el prolapso tiene el tabique recto-vaginal, puesto que como hay eversión recto-vaginal puede existir la reciproca.

Especulo Rectal.—Completamos nuestra exploración observando al especulo rectal, bajo anestesia a la novocaína, lo cual nos permite distender la luz ano-rectal y ver todo lo que pueda presentarse y comprobar o desechar los datos de la exploración digital.

Historial Clínico.—La importancia del historial clínico se debe a que mediante él, establecemos las condiciones fisico-biológico-patalógicas del paciente y así determinamos la naturaleza del terreno y con este objeto insistimos principalmente sobre sus hábitos, costumbres en la infancia y adolescencia, vicios de degeneración y sus antecedentes patológicos y taras hereditarias o adquiridas.

Diagnóstico.—Puesto a la vista el prolapso, tactado y medido, podemos catalogarlo como anal, rectal o ano-rectal.

Si es prolapso anal, se ve claramente la eversión de la piel y demimucosa del canal anal. Y la desaparición de los pligues del ano y sus márgenes.

El significado del prolapso simplemente anal, aun queda en tela de juicio porque si observamos en las diferentes escalas zoológicas vemos como hecho normal este prolapso ya estático ya funcional. En el caballo por ejemplo, en el momento de defecar se observa como el ano se prolapsa hasta una extensión de 4 o 5 ctms. y reducirse luego de haber terminado la expulsión del excremento. En los monos huistitis existe este mismo prolapso sin que se haya pensado atribuirles significado patológico y en nuestra observación diria, al examinar hemorroides, vemos como con un pequeño esfuerzo se evierte la mucosa anal, distindiendo los pliegues del periano y desapareciendo en cuanto el paciente deja de pujar.

Si es un prolapso interno o rectal llegaremos a diagnosticar sólo mediante un recurso especial, porque por el simple hecho de introducir el espéculo y distender la luz rectal, el prolapso desaparece; en este momento retiramos muy suavemente el instrumento, haciendo al mismo tiempo pujar al paciente y veremos que la mucosa rectal rebasa sobre el espéculo como un rodete grueso. Pero aun asi, puede confundirse con una procidencia interna y para diferenciarlos tenemos que tomar en cuenta los caracteres de cada uno de ellos; la procidencia es un cilindro grueso y de mayor consistencia que el prolapso y es una afección muy rara; mientras que el prolapso está consitutido solamente por la capa mucosa y es de consistencia blanda, y su frecuencia no guarda relación con la de la procidencia.

Si es un prolapso anorectal, facilmente puede confundirse con una procidencia externa; pero en el caso de la procidencia hay un surco circular por donde se puede recorrer circularmente con el dedo índice, mientras que en el prolapso ano-rectal no existe este surco y del ano al recto se pasa sin encontrar solución de continuidad.

Los casos de nuestra modestísima casuísitica corresponden a esta última variedad, excepto el último que actualmente está en nuestro servicio, que presenta un prolapso anal hemorroidado. Este paciente se hospitalizó por sus hemorroides, que le fueron ya resecados y al 6° dia del postoperatorio el ano se presenta fruncido y sin señas de prolapso.

Mecanismo de Acción del Cerclaje Proteínico.—¿Es hormonal? ¿Es metabólico? ¿Es una acción específica de los proteicos lácteos in loco dolente?

Parece un tanto utópico que pueda producirse una acción tónica local sobre las fibras musculares y que éstas contrayéndose reduzcan el prolapso. Lo propio nos parece la acción neuro-excitadora a punto de partida de la inyección proteica. Es lógico aceptar estas funciones farmaco-dinámicas, pero no como factores únicos y esenciales sino como coadyuvantes.

Se ha pretendido invocar una acción dinámica específica de los proteicos, acción tireotropa que determinaría un mayor metabolismo y un mayor tono biológico. Posible que esto suceda en niños, pero la observación hecha por nosotros de la reducción de voluminosos prolapsos aun a partir de la primera sesión de leche, nos hace pensar sobre cómo en tan breve plazo pueda una concatenación proteico-hormonal determinar un éxito terapéutico tan violento.

La mayor tirogenesis a punto de partida de la excitación proteica, determinaría una mayor tonicidad del esfinter anal por intermedio del simpático. Pero hay un hecho importante en nuestra observación y es que esta tonicidad esfinteriana, después que se ha producido el prolapso, parece estar aumentado ya por el volumen mismo del prolapso que actúa como cuerpo extraño in situ, o por factor inflamatorio sobreañadido; determinando la congestión, la dificultad de reducción y el dolor consiguiente de los prolapsos.

Aceptando pues todos estos mecanismos, como factores que modifican el terreno en el sentido de le mejoría y que obran a largo plazo, nosotros pensamos que el factor determinante de la reducción del prolapso, aun desde la primera aplicación de leche en el periano, es el fenómeno irritativo sobre todos y cada uno de los elementos del ano-recto y los que lo rodean; fenómeno irritativo que en un primer momento actúa por el dolor que inhibe toda función local manteniendo en hipercontracción toda aquella armadura muscular que hemos descrito al principio. Y como quiera que juntamente hacemos una terapia de inhibición fagal, hay un reposo absoluto, que dura todo el tiempo del tratamiento hasta que al final, el fenómeno irritativo cede su lugar al proceso de fibrosis que mantendrá definitivamente fijado el prolapso, por retracción de todos los elementos hacia los puntos donde se ha inyectado la leche, a semejanza del anillo de Thiersch en los niños, que después de un mes o más, de estar aguantando el prolapso, al retirársele deja en su lugar un anillo cicatrizal que lo fija definitivamente.

TECNICA DE NUESTRO PROCEDIMIENTO

En toda la literatura revisada hemos visto que en ninguna hay la menor referencia al empleo de este tratamiento en el adulto. Algunos tratadistas hacen del procedimiento una mención honrosa sin dar mayor detalle de casuística ni resultados obtenidos, menos de las condiciones previas o posteriores al procedimiento.

Cómo procedemos nosotros:

Primera condición esencial, *sine qua non,* es catalogar al individuo exactamente en sus condiciones bio-patalógicas, determinar la naturaleza del terreno y modificarlo en el sentido de la normalidad. ¿Es un hiponutrido? ¿Es un sifilítico? ¿Es un enflaquecido? ¿Es un anémico? etc.

Tomamos algunas semanas para el tratamiento previo y somtemos al paciente a un régimen reglado de sobrea limentación y medicación reconstituyente a base de extracto hepático, arsenicales, estricnina y vitaminas; corregimos el estreñimiento mediante una adición adecuada de celulosa y agua, controlando el peso sistemáticamente cada 8 dias. Es decir, elevamos su tono muscular, estimulamos su biologismo y si hay tuberculosis o sífilis rechazamos al paciente y ponemos en manos del especialista para su curación previa.

Puesto asi el paciente en condiciones óptimas, en la víspera de la intervención mandamos aplicar un enema evacuante y suministramos una pildora de 2 centigramos de extracto de tebaico. En la mañana misma, antes de la sesión, mandamos aplicar otro enema evacuante y tomar otra pildora de tebaico. Colocamos al paciente en la posición proctológica y con una aguja de 6 ctms. aplicamos escasamente ½ centímetro de leche estéril en 4 puntos cardinales del perirecto guiando la punta de la aguja con el dedo índice introducido en el lumen, a fin de practicar la inyección lo mas cerca del perirecto.

Queremos recalcar aquí la diferencia notable de nuestro procedimiento con el de algunos autores: nosotros aplicamos en una primera sesión justamente medio centímetro, miéntras aquellos indican 10 o 20 centímetros. Practicamos así porque los pacientes de nuestra casuística son sensibles al *chock* proteínico; al menos fué nuestro pensamiento inicial y posteriormente lo sistematizamos en vista de su eficacia.

Diferimos también de la técnica empleada en niños por Shoster y Lenebach en que éstos intruducen le aguja a través de la mucosa anal y nosotros lo hacemos a través de la piel del periano, porque pensamos que se podrían arrastrar elementos de contaminación hacia el perirecto y a la fosa isquiorectal.

Durante los siguientes días, mantenemos al paciente con dieta blanda y con medicación análgica y pequeñas cantidades de amerol. Tomando las mismas precauciones hacemos la segunda aplicación al 3° día: esta vez doblamos la cantidad de la leche y aplicamos 1 cc. en otros 4 puntos diferentes a los de la primera sesión y siempre en posiciones opuestas. Despúes de otros 3 días hacemos la tercera aplicación y así hasta conseguir el resultado deseado aumentando cada vez medio centímetro cúbico y siempre en puntos diferentes, guiándonos, a fin de hacer inyecciones bien distanciadas, por las horas de la esfera de reloj. Quiere decir que si tuviéramos que aplicar innumerables veces, habríamos hecho tantas como minutos tiene la esfera de reloj y en conjunto, la fibrosis provocada sería en absoluto semejante a la provocada por el alambre de Thiersch.

Pero en los casos que hemos tratado, no hemos necesitado aplicar sino por cuarta vez en un paciente y en los demás por tercera vez.

La leche que utilizamos es de preferencia leche íntegra de vaca, fresca, que la esterilizamos momentos antes, por ebullición; preferimos a la leche tindalizada porque nos ha dado mejores reacciones generales y locales.

Lamentamos que nuestra casuística sea tan reducida: 8 casos, de ellos 7 con éxito definitivo y uno recidivado, todos ellos observados en el curso de dos años. La recidiva del caso único fué hasta alcanzar sus dimenciones iniciales, pero se trata de un individuo tarado, sordo-mudo de nacimiento con reacciones serológicas fuertemente positivas. Este paciente fué sometido al tratamiento preconizado despúes de un intenso tratamiento antiluético y estando negativas sus reacciones; sin embargo a los 6 meses, principió a perder nuevamente sangre en las deposiciones y cuando lo vimos, presentaba otros paquetes hemorroidiarios que deformaban el anillo prolapsado y juntamente ostentaba un axcema salvarsánico generalizado. Lo operamos de sus hemorroides sin conseguir corregir su prolapso.

Otro caso que vale la pena mencioner es el de un conductor de ómnibus, indivíduo pusilánime, propenso a la lipotimia que recibió una única sesión y luego pidió el alta. Despúes de mucho tiempo lo vimos incidentalmente y había curado de su prolapso.

El penúltimo caso lo mencionamos porque también se trata de un paciente hiperestésico, que recibió una única aplicación sin querer someterse a las demás por el dolor que experimentaba, entonces lo anestesiamos previamente con novocaína y vimos que a las 24 horas el prolapso se presentaba con sus mismos caracteres. De lo que sacamos una conclusión: que bloquedas las terminaciones nerviosas no había ese dolor inhibidor al que nos hemos referido anteriormente. Como quiera que este paciente a tenía la vez hemorroides, lo operamos y después de 12 dias observamos que el prolapso no se presentaba. Sobre este particular aun no podemos hablar de éxito curativo y más bien esperamos que a breve plazo veamos nuevamente el prolapso.

Son pues tópicos interesentes por considerar los siguientes: prolapso rectal y hemorroides; prolapso rectal y estreñimiento; cerclaje proteínico y dolor.

Es decir, que en la asociación prolapso-hemorroides, este último factor juega rol primordial, teniendo que dejar nosotros establecido, que la hemorroidectomía previa es condición indispensable para el éxito cerclaje proteínico.

Algo semejante tenemos que decir de la asociación prolapso-estreñimiento Tratar el estreñimiento es el problema básico para el éxito de este método, pues si simultáneamente no se ha corregido este factor predisponente se corre el riesgo de una recidiva.

Finalmente, un último tópico de trascendencia es el dolor que provoca la inyección de leche y es necesario pensar que, si como hicimos en nuestro último paciente, bloqueamos las terminaciones nerviosas, el fracaso será evidente. ¿Son acaso las fibras nerviosas las encargadas de provocar, sea el metabolismo local de la proteinas, o de desencadenar la fibrosis, por ser elementos mas sensibles al agente que empleamos?

Esto será materia de nuestras próximas investigaciones.

CASUÍSTICA

	Sesiones	Resultados
José V.	4	Curado
Matías M.	4	Curado
Antonio M.	3	Curado
Eulogio G.	4	Recidivado
Juan C. P.	1	Curado
León P.	3	Curado
José A. S.	2	2ª sesión con novocaína
Enrique C.	Prolapso anal curado por hemorroidectomía	

OMPHALOCELE

(Continued from page 95)

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ABDOMINAL "EPILEPSY"

(Contiued from page 100)

con altri casi publicati da Moore. Tuttì i sintomi dileguarono con una cura medica antiepilettica: la specificità delle cura venne confermata da una recidiva appena sospesi i medicamenti.

SUMARIO

El autor describe en detalle el caso de una joven en los comiensos de la tercera decada de la vida que presento en los principios de la enfermedad un síndrome simulando la obstrucción intestinal aguda y una historia de varias intervenciones quirúrgicas en otros hospitales para el tratamiento de dicho síndrome en ataques precedentes.

Debido a la similaridad de este caso con los de Moore y el hecho de que este caso fallo de responder al tratamiento se llego a la conclusión de un diagnostico de epilepsia abdominal. Cuando se instituyo un tratamiento de acuerdo con este diagnostico la pacienta mejoro notablemente y tambien es muy significante el hecho de que cuando se descontínuo dicho tratamiento por un periodo corto de tiempo el síndromo retorno contoda su intensidad.

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que la gastritis atrófica no es una enfermedad del estómago sino la expresión de una condición general del organismo. Estudios clínicos y patológicos no han podido demostrar que la llamada gastritis atrófica crónica sea producida por una inflamación de la mucosa gástrica. Benedict [21] ha sugerido que se debe a factores de deficiencia. Guiss y Stewart [21] han encontrado una ocurrencia similar de gastritis atrófica en casos con diferentes enfermedades gástricas o no malignas y en casos de cancer gástrico. Los mismos han hallado en autopsias de sujetos aparentemente normales mayores de 40 años, que el 82 por ciento de estómagos presentaban gastritis atrófica, característica en el 97 por ciento de estómagos con cancer gástrico. La degeneración de la úlcera benigna en maligna no ha sido probada en forma alguna. Ewing [16] dice: "El tema de la histología del cancer gástrico está en su infancia, si ha alcanzado ya este nivel."

La graduación del tipo de cancer gástrico ha sido planteada siguiendo dos clasificaciones: microscópica [25] y macroscópica.[26] Schindler [16] ha encontrado la segunda de mas valor. El mismo autor [16] ha comparado la importancia del estudio macroscópico y microscópico del cancer gástrico en 39 enfermos encontrando que no existe entre ambas una estricta correlación.

El tipo macroscópico de cancer y la extensión de las lesiones malignas ha sido sugerida como criterio de posibilidad operatoria [15, 16] lo cual no es aceptable hoy en dia. Pues el progreso de la moderna cirujía ha hecho posible la resección extensa de tumores abdominales. La frecuencia de la resección del cancer gástrico ha alcanzado el 43.5 por ciento [27] y 44 por ciento.[28] Frecuentemente es posible apreciar en pacientes operados que ciertos tumores de pequeño tamaño producen extensas metastasis desde temprano y por el contrario ciertos tumores polipoides de gran tamaño no las producen sino muy tardiamente. El criterio de resección gástrica es pues un problema dependiente en gran parte de las metastasis del tumor gástrico. Si existe alguna correlación entre el tipo y el tamaño del tumor y su operabilidad no es en forma alguna una correlación absoluta.

Las lesiones malignas del estómago pueden ser de tipo infiltrante, polipoide o ulceroso. El examen gastroscópico de cada caso debe ser considerado en una forma particular en lo que se refiere a la localización de dicho tumor, a su tamaño, extensión y tipo de lesión.

El tipo infiltrante que es el de peor pronóstico ha sido encontrado por Schindler [29] en el 63.2 por ciento de los casos. La infiltración carcinomatosa puede ser difusa o localizada. En la primera llamada linitis plástica la gastroscopía contribuye poco al diagnóstico, rara vez el gastroscopio puede ser pasado al estómako, pues el cardia se encuentra infiltrado haciendo imposible el paso del instrumento. Este diagnóstico queda pues reservado para la radiología. El cancer infiltrante de tipo localizado aparece gastroscópicamente mostrando una mucosa indurada, rígida, granular pálida y sin motilidad. El diagnóstico diferencial de estos casos incluye: gastritis hipertrófica, sífilis, linfoblastoma y linfosarcoma. Cuando el tumor infiltra el antro pilórico le confiere la apariencia de un cono rígido bastante característico. En otras ocasiones la infiltración cancerosa que sigue los linfáticos del estómago toma un aspecto concéntrico invadiendo un segmento sumamente localizado, lo cual es claro en los tumores localizados a nivel pilórico. Estas lesiones de tipo concéntrico producen síntomas de obstrucción pilórica y en veces no son conceptamente diagnósticas ni por radiología ni por gastroscopía. Este último procimiento solo permite localizar una imagen muy similar al pilóro normal, con ondas peristalticas que terminan a nivel de la obstrucción en forma concéntrica y diafragmática.

Es más indicado el emplear el término cancer ulcerado que el de úlcera maligna, puesto que posiblemente todas las lesiones malignas ulceradas han sido desde su inicio cancerosas. El diagnóstico diferencial entre cancer ulcerado y la úlcera benigna del estómago depende de muchos factores, uno de los mas importantes es la localización de la lesión ulcerosa. Schindler [30] ha hecho un estudio detallado de los signos en favor de las úlceras de caracter benigno y maligno, dividiendolos en cuatro grupos. En el primer grupo considera los signos en favor de lesión benigna v. gr.: límite definido de la úlcera sin bordes levantados, falta de infiltración de la mucosa circunvecina, presencia de puntos hemorrágicos sobre dicha mucosa, distorsión en arco del ángulo del estómago o signo de Henning, pliegue mucoso que produce una deformación en reloj de arena, y finalmente la presencia de pliegues de la mucosa convergiendo hacia la lesión ulcerosa. En el segundo grupo incluye los signos que no prueban la benignidad de la lesión tales como, la mucosa normal distante de la úlcera, el color uniforme de la pared gástrica de la mucosa circunvecina, la presencia de islotes mucosos dentro de la úlcera. En el tercer grupo están incluídos los signos en favor de conos ulcerizados. Ellos son: inclinación de uno de los bordes de la úlcera, nódulos y masas tumorales en sus inmediaciones, puentes de mucosa cubriendo la ulceración, nódulos y material cristalino flotando en su suelo, hemorragia de uno de sus bordes, color obscuro de sus paredes, palidez de la mucosa circunvecina y ulceraciones en la pared que rodea la úlcera. En el cuarto grupo de signos quedan incluídos aquellos que no prueban su malignidad v. gr.: su gran tamaño, cambios atróficos de la mucosa circunvecina, paredes edematosas y endurecidas de la mucosa, borde irregular, material necrótico o nódulos en su suelo. Es muy importante el considerar la localización de la lesión ulcerosa. Las úlceras pilóricas visualizadas gastroscópiamente son prácticamente siempre, de índole maligna pues las ulceraciones benignas deforman el antro pilórico en forma tal que no permiten la visualización del píloro.[29] Schindler ha encontrado que las úlceras con infiltración gástrica de etiología maligna ocurren en el 17.6 por ciento y aquellas sin infiltración gástrica en el 16 por ciento de los casos.[23] realizada por un experto endoscopista es de gran valor en el diagnóstico de las ulceraciones gástricas.

Las masas polipoides del estómago producen al examen radiológico una característica falta de relleno. Estas imágenes al examen gastroscópico pueden corresponder a diferentes lesiones v. gr.: las formas de apariencia nodular y tumoral de las gastritis hipertróficas, la poliposis múltiple benigna del estómago, los tumores benignos del estómago y la mucosa redundante gástrica. El tipo de carcinoma polipoide ha sido encontrado por Schindler[29] con una frecuencia de 2.9 por ciento entre los tipos de cancer gástrico.

Cuando las lesiones polipoides están localidas cerca del cardia, el gastroscópico, a veces, no puede ser pasado al estómago. Moutier[31] ha individualizado la región yuxtacardiaca del estómago en clínica, radiología y gastroscopía con criterio que tiene mucho interés en el diagnóstico diferencial de las lesiones situadas en el cardia o en las inmediaciones de esta región. Cuando los tumores polipoides están localizados en el tercio inferior o medio del estómago frecuentemente co-existen con lesiones de tipo ulceroso y presentan poco dificultad en el diagnóstico gastroscópico.

La gastritis crónica hipertrófica ocasionalmente se acompaña de un desarrollo considerable de los pliegues de la mucosa gástrica, los cuales producen imágenes radiológicas con falta de relleno que son difícilmente diferenciables de las producidas por un cancer polipoide. En mi experiencia he encontrado de gran valor al hacer el diagnóstico diferencial gastroscópico de esta variedad de gastritis hipertrófica el hallazgo en los pliegues hipertróficasos de una mucosa, cierta granulación que semeja las pequeñas piedras de un pavimento característica de las gastritis hipertróficas, los pliegues asimismo siguen una dirección paralela al eje mayor del estómago. En la literatura se han descrito muchos casos de gastritis hipertrófica las cuales tuvieron un diagnóstico de cancer radiológicamente que fué desvirtuado luego en el acto operatorio.[31-38] La gastritis hipertrófica de tipo nodular tiene un aspecto muy particular produciendo nódulos de tamaño uniforme, que en los casos de tipo difuso aparece produciendo imágenes laculares múltiples del estómago. La mucosa al examen gastroscópico aparece cubierta de muchas eminencias semejando pólipos los cuales pueden alcanzar en ciertos casos el tamaño de una cereza.[39] Los tumores benignos del estómago producen imágenes de dificil interpretación radiológica cuando ellos son con fluentes simulando el cancer gastrico. La gastroscopia no solo permite hacer este diagnóstico con gran aproximación sino en algunos casos puede establecer la transformación de un tumor benigno en maligno como fué observado por nosotros en un caso.[13] Schindler[40] ha descrito un signo que el considera de gran valor en el diagnóstico de los tumores benignos del estómago y que consiste en la presión de un pliegue de la mucosa en la superficie del tumor haciendo considerablemente menor el espacio entre el tumor benigno y la mucosa que lo cubre.

La tercera condución que simula ocasionalemente a la radiológica una imagen polipoide debida al cancer, es el prolapso de una mucosa gástrica normal punto que no ha recibido énfasis alguno en el estudio gastroscópico. La formación en el estómago de pliegues de tamaño considerable, especialemente a nivel del antrum produce radiológicamente una imagen que ha sido descrita como "papel arrugado" Estos pliegues aparecen y desaparecen con las contracciones del estómago. Ultimamente tuvimos la oportunidad de ver uno de estos casos diagnosticado radiológicamente como cancer pilórico el cual en sucesivos exámenes, tanto gastroscópicos como radiológicos, pudo establecerse definitivamente que se trataba de mucosa redundante gástrica. En estos casos los pliegues formados están cubiertos de mucosa normal a diferencia de los gruesos pliegues indurados que ocurren en la gastritis crónica hipertrófica. Moersch[4] ha reportado un caso de mucosa redundante del estómago en la cual la lesión fué interpretada gastroscópicamente como cancer y sólo a la operación pudo ser establecido el correcto diagnóstico. Cordier y Chevalier[42] han descrito un caso con signos radiológicos sugiriendo un tumor gástrico que fué encontrado gastroscópicamente era debido a un edema del antro pilórico del estómago produciendo un aspecto pseudo tumoral, que los autores sugieren como debido a un edema angioneurótico.

En 1,297 casos consecutivamente estudiados un la radiológica y gastroscopía mostraron que en casos de cancer gástrico algunos fueron diagnósticados solamente por rayos y otros solamente por gastroscopía.[13] En el primer grupo hubo 21 casos. La localización de la lesión fué:

Cardia	1
Tercio media del estómago	4
Píloro	3
Tercio inferior del estómago	11
Lenón no especificada	2
Total	21

El diagnóstico gastroscópico en estos casos fué:

Gastritis atrófica	6
Gastritis hipertrófica	5
Gastritis mixta: atrófica e hipertrófica	2
Negativa	5
Examen no satisfactorio	3
Total	21

En 7 de estos casos no pudo seguirse la evolución de los enfermos no comprobándose la veracidad de dicho diagnóstico, en tres de ellos el diagnóstico radiológico mostró ser equivocado en la intervención quirúrgica y en 11 pudo ser comprobado. En todos estos casos la lesión cancerosa no fué visualizada o lo fué incorrectamente, interpretada gastroscópicamente.

En 10 casos de cancer gástrico fueron diagnosticados solo por gastroscopía y no vistos por radiología. Uno de estos, después de operado, mostró ser, al examen histólogico del estómago, un proceso benigno, dos no tuvieron comprobación operatoria y en 5 fué comprobada la veracidad del diagnóstico gastroscópico. De estos 5 casos el tumor fué ulceroso en tres, polipoide en un caso y mixto en otro.

SUMARIO Y CONCLUSIONES

1. La importancia de la gastroscopía en el diagnóstico del cancer gástrico es descutida.

2. Gastroscópicamente creo que no es posible diagnósticar la operabilidad del cancer gástrico.

3. El doble significado de la palabra lesión "precoz" es discutido.

4. El diagnóstico gastroscópico del cancer gástrico debe ser considerado teniendo en cuenta la localización de la lesión, su extensión y tipo. En la forma difusa infiltrante neoplásica o linitis plástica el valor gastroscópico es mínimo siendo la radiología el método de elección. Los carcinomas infiltrantes localizados del tercio medio e inferior des estómago son en general diagnósticables fácilmente por gastroscopía. La radiología da informaciones más precisas sobre las tumores localizados en el píloro o en el cardia.

5. El estudio conjunto de los diversos signos descritos para diferenciar las lesiones ulcerosas de tipo maligno y benigno es considerado de más valor que el estudio de dichos signos en particular.

6. La gastroscopía permite en el mayor número de casos el diferenciar las diversas lesiones que producen una imagen radiológica con falta re relleno tales como el cancer polipoide los tipos nodular y tumoral de las gastritis hipertrófica. los tumores benignos y la mucosa redundante del estómago.

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Editorials

Science Leads the Way

FOR six thousand years before the birth of Christ civilization marched forward through achievement of scientific endeavor.

The sciences of embalming, surgery, architecture, and agriculture were already established in the narrow valley of the Nile when China and India were but budding empires in the far removed Orient.

Then came science leading the way to exploration of other lands through the medium of ships, maps and astronomy. The rewards were newer lands, greater riches and more abundant opportunities. The discovery of new continents meant conquest with its corresponding native resistance, rebellion and battle. This meant war, and science again lead the way to various means and methods of destruction of man. How much science has progressed to the present time can well be reflected in the modern armamentarium of warfare including guns, tanks, battleships, submarines and planes.

The more recent, ultimate, in destruction of life and property is the appropriation of nuclear energy into the workable and destructive force of the atomic bomb. Here again science leads the way for mass destruction of human beings as contrasted to its former creation of blessings for a growing civilization. In every phase of our economy we have developed and progressed through scientific research, crudely as the term might have been used in earlier and more formative years.

Before the application of science the savage looked upon disease as punishment from some angry god. The symptoms were ascribed to the machinations of departed spirits or ghosts, to activities of slain animals, to human enemies supposedly possessed of supernatural powers capable of casting spells of mental and physical aberrations over the body. The cure, then, naturally followed along the lines of the same type of primitive thinking and resolved itself into two fundamental procedures: first, to atone for the offense by making sacrifices calculated to propitiate the offended deity, or by doing penance for one's sins even to the point of personal torture by submitting to, or committing, self-inflicted wounds. Second, on the assumption that the disease had resulted from the invasion of the body by unfriendly demons, the relief, it was thought, might be obtained by making the body as unpleasant an abode as possible for such evil spirits or demons. This was accomplished by starving, torturing the victim, by the taking of nausea-producing herbs, by vomiting and similar drastic measures.

Science began to exert its influence with early Greek civilization some 400 years before Christ. The Greeks recognized a god or goddess for every phase of their existence, and among these was Asklepias (more commonly called by his Roman name, Aesculapius), the god of medicine. The sick and infirm continued to pray to the god of medicine. Then about 300 years before Christ came the more or less scientific writings of Hippocrates, who dealt with "humors" of the blood, fractures and dislocations in a respectable manner but with little or no knowledge of anatomy.

Galen, in the second century of the Christian era, made valuable contributions to the science of anatomy and physiology. The study of anatomy, perhaps the most outstanding contribution to the new era in medicine, was further developed by Vesalius whose book on Anatomy was followed in close detail by Ambroise Paré in his development of surgical technic.

Science extended its service to humanity with the work of William Harvey who published in 1628 his immortal discovery of the circulation of the blood; with John Hunter who is considered by Garrison and others to be the founder of experimental and surgical pathology; with Louis Pasteur through his discovery of bacteria and fermentation and the process which could inhibit the destructive effects of such organisms; with Joseph Lister whose work, predicated upon the work of Pasteur, inaugurated the antiseptic period in surgery, which has now been supplanted by the more modern era of asepsis. Then came the discovery of x-rays by Roentgen in 1897, of radium by Pierre and Marie Curie in 1898. Much of the rapid progress in medicine is due to these discoveries which deserve to be recorded among the greatest contributions of all time to the advancement of medicine and science.

Even so innovations in medical and surgical science of the current period become too numerous to recite. Suffice it to say that almost yearly science brings forward a new discovery of permanent value which prolongs the life or ameliorates the suffering of humanity. We recall the discovery of insulin by Dr. Banting of Toronto which added years of usefulness to diabetic patients, the discovery of sulfanilamide by Gerhard Domagk of Germany whose victory over certain types of infection has been phenomenal, the discovery of penicillin by Dr. Fleming of England with its remarkable control of the streptococci and similar infections which, when combined with the newer sulfa compounds, has reduced the extremely high mortality of pneumonia from 25 per cent to 9.3 per cent.

Modern surgery owes a debt of thanks for the studies from which evolved the four compatible blood groups discovered just prior to World War I. Both operability and morbidity, as well as lowered mortality, have received a marvelous impetus because of the utilization of whole human fresh blood in the aged or substandard risk.

In Colonial America, we find the men of science seeking professional fellowship through organization of a medical society in 1735. This was a forerunner of the Massachusetts Medical Society and, oddly enough, was organized just 200 years before the International College of Surgeons was founded in Geneva, Switzerland.

It remained for Dr Nathan S. Davis of Chicago to organize the American Medical Association in 1846. Though dead for three quarters of a century, he remains in the affectionate recognition of American physicians as the Father of the American Medical Association. He also founded the Chicago Medical College, later to be known as Northwestern University Medical School. He was the first editor of the *Journal of the American Medical Association* which made its first appearance to the physicians of America in July 1883.

In America, the desire for study and advancement of medicine became increasingly greater, and in 1910 the Clinical Congress of Surgeons was organized which, in 1913, was combined with the newly organized American College of Surgeons. The College promptly began the standardization of hospitals, the differentiation between surgeons and practitioners of internal medicine, as well as other specialties, the establishment of cancer clinics with minimum standards of service, the creation of a superlative library and service with a JOURNAL which has grown to be one of the finest in the world. Many of these services should have been done by the parent organization, the American Medical Association which, by and large, should lead the way and create the pattern by which all subsequent organizations should grow and function. The American College, the Royal College of England and Ireland, of Canada and of Australia, all have more or less limited their sphere of activity to their respective countries as evidenced by their names.

With the advent of World War I, surgeons of many foreign countries were thrown together in an allied effort to win the war against Germany. Naturally, methods of surgical procedures and related activities were discussed, mutually profitable ideas were exchanged, lasting friendships were made, and an insatiable desire was aroused to exchange methods, ideas, standards and, most of all, to continue the friendships they had learned to treasure and respect.

This desire spread over the world, with increasing interest in foreign lands as well as in our own America. The idea of an International College of Surgeons originated with Dr. Max Thorek of Chicago. A group of noted surgeons met in Switzerland and after thorough deliberations the College was founded in Geneva in 1935 and incorporated later in Washington, D. C. It was decreed that since the idea was promulgated by an American surgeon, a distinguished member of the European profession should be made President. Professor Arnold Jirasek, a most capable surgeon, author and teacher of Prague, Czechoslovakia, was wisely chosen for this honor.

Thus, on that memorable day in 1935 in beautiful and peaceful Switzerland, whose greatest weapon of defense is the jealousy of her surrounding stalwart powers, was founded an organization whose very name flashed over the world and caught the synchronous thinking of a dormant ideal and activated it into a living, growing cosmopolitan institution for the elevation of surgery and surgeons everywhere.

Motivated as it is by the Creed of Pasteur, that Science belongs to no country because Knowledge is the patrimony of humanity, the torch which enlightens the world, the International College of Surgeons strives to create a common bond among the surgeons of all nations and to promote the highest standards in surgery *throughout the world without regard* to nationality, creed, or color.

As an attestation of the demand for an International College, there are already members in fifty-one countries of the world, and many of these have active, thriving chapters busy in pursuit of their avowed objective—international good will, professional fraternization, and the elevation of surgical standards.

There is not now, nor ever has been, any thought or desire to detract from the prestige, purpose or program of existing surgical organizations in the various countries of the world. Rather would the International College of Surgeons hold out the hand of a world organization to welcome into its membership such fine organizations as do now exist only on a *national level in the* various countries. Thus can be envisioned an association of surgical organizations, already powerful in scope and influence on a national level, amalgamating themselves into an International family in which there should exist no rivalry, but which could and *would* become a great *unifying potentiality for* world peace and universal standardization of surgical principles and procedures.

Truly, in my humble opinion, this is not a dream of a surgical Utopia, but is the present trend in thinking of peace-loving men of science everywhere. These impressions have been gathered as I have traveled in most of the countries of the world and through correspondence with countless numbers of leading surgeons throughout the vast empires of the earth.

Time will be required to annihilate suspicion, jealousy and envy, which have been the short-lived adversaries of every worthwhile organization in existence. Without exception, however, the newer organization, born at a propitious time, with broader and newer concepts in keeping with the changing trends, has grown in power and prestige because of its forthright purpose and program. The animosity toward it of dwarfed personalities will perish, its opposition will become a trembling shadow of age, and the organization, with modern methods, unselfish purpose *and dynamic leadership,* will march proudly on to solidarity of purpose in securing and maintaining world peace and a higher level for the science of surgery.

May I repeat that there should be no reason for jealousy in an organization which is global in scope and in which, at most, the competitive Society or College is only one of the many potential component Chapters of the parent organization. Such is the case as it exists in the International College of Surgeons. Its scope and sphere of activity are truly international, extending the hand of cooperation and support to all reputable surgical organizations operating on a national level.

Conceived by men of vision and altruism, its progress and purpose guided by men of science, The International College of Surgeons moves steadily on to higher levels in which *science leads the way.*

HERBERT ACUFF
President, United States Chapter
International College of Surgeons

Changing Views on Acute Abdominal Disease

TIMES change and our views on acute abdominal disease change with them. A change of view may be due either to a change of scene or a movement of the onlooker. That the acute abdominal field of view has altered cannot be doubted. Different conditions of life have produced varying types of disease. Older surgeons will recall that 40 years ago acute perforation of a gastric ulcer was a fairly common occurrence among chlorotic young women of about 20 years; chlorosis has disappeared and we now seldom see acute ulcers perforate in young women. The frequency of perforated duodenal ulcer in men has undoubtedly increased during the same period. Acute tuberculosis of the peritoneum is rarer than it used to be, probably due to better treatment of tuberculosis in general. Regional ileitis or Crohn's disease has become a more common disease, and endometrioma and its acute surgical complications also seem more in evidence. Even the age of our patients is tending to change, for with an increasing proportion of older members of the population we find more persons of 70 and 80 coming for treatment for acute abdominal disorders.

But it is not this aspect of the question that I wish to discuss, but rather the changed attitude which surgeons adopt towards the abdominal crisis. Within my professional lifetime the surgical standpoint has appreciably altered. You will recall that the whole of this province of surgery is of recent growth. The epoch-making paper by Fitz on acute appendicitis was published in 1886, and the first successful, planned appendectomy was done by Morton in 1887. The first successful suture of a perforated gastric ulcer took place in 1892 in a little town in the Ruhr. I began my medical studies in 1900, when acute abdominal surgery was just getting into its stride and I have grown up with it. There has been a noticeable change of attitude. *[illegible] years ago surgeons were trained as anatomists and knew little of physiology.* Looking at things chiefly from an anatomic standpoint, their surgery was *mechanical.* They thought it was merely necessary to remove the diseased appendix or relieve the obstruction and all would be well. They believed that washing out the peritoneal cavity with gallons of antiseptic fluid or saline solution would cleanse it of all septic impurities, and that the insertion of a series of drainage tubes into various parts of the abdomen would adequately drain it. Only gradually did experience teach that the natural physiologic response of the tissues should be encouraged, for nature could do much better than most of those who tried to improve on or usurp her methods.

An acute abdominal case was thought to be so grave that to wait a moment was perilous. *Preoperative treatment was neglected,* and the patient often operated upon before the shock effect of the journey to the hospital had worn off. Contrast that with the recently expressed view of an expert: "the severely dehydrated patient has not the stamina to endure even the most careful surgery, and even though the passage of three or four hours might increase the likelihood of gangrene in the strangulated bowel, it is a safer course in the long run to spend this time in performance of the blood chemical and haematological determinations indicated and an appropriated partial hydration at least." Moreover, in their emphasis on the local disturbance, surgeons at that time were prone to attempt too much. Gradually the necessity of dealing with some emergencies in two stages came into prominence, e.g., the wisdom of performing a preliminary cecostomy or colostomy before excision of an obstructing growth of the colon or rectum. and the folly of trying to remove the appendix in every case of localized abscess or generalized peritonitis. The saving of life had to take priority over a perfect operation.

Consider how this change affected the three groups of cases, the perforations, the inflammations and the obstructions.

The commonest perforation is that of a peptic ulcer. The first technic for its suture was to close it with Lembert sutures and to wash out the peritoneal cavity with lotion and insert many drainage tubes. Then some-one suggested that in some cases a plug of omentum might help to close the opening. The narrowing of the pylorus caused by suturing led to *the performance of gastrojejunostomy in some cases.* Then Keetley in 1902 took the bold measure of excising the pylorus together with a perforated ulcer in that situation. This remained a rare technic until it was independently taken up by Judin of Moscow, who soon made this his routine operation for perforation and obtained results which compared favorably with those attained by other means. Finally, of late, the treatment has gone full circle and we have some surgeons who recommend nonoperative conservative treatment of a perforated ulcer; the stomach is kept quite empty by means of an indwelling tube, *nothing is given by mouth* for 48 hours and the patient's strength is maintained by intravenous, rectal or subcutaneous administration of appropriate fluids, while the mind is calmed by small doses of morphine. The mortality of this method of treatment is at least comparable to some, but not the best, published results. You may ask which is the best treatment? In the *majority* of cases a simple suture is best for the ordinary surgeon. If a sucker be available to make the peritoneum dry, there is no need to drain. There may, however, occur cases in which both extremes of treatment may be useful. From time to time one meets with large friable ulcers in a mobile stomach in which the best treatment may be to perform a partial gastrectomy; on the other hand when the general condition of the patient is poor, the blood pressure low and the outlook for operation bad, there may be a distinct field for the nonoperative method. Both these extremes should, however, be exceptional.

How have views changed with regard to acute infections? In the case of appendicitis the United States have been pioneers all the way. Fitz, Sands, Senn, McBurney, Murphy and Ochsner showed the importance of early diagnosis and prompt operation. It was soon *realized that operation before perforation* was the ideal plan After perforation risks were greater. When I was a student, immediate operation was undertaken irrespective of the pathologic condition. But from the first there was one important voice—the voice of Ochsner—which claimed that though operation was always necessary, it was not always immediately necessary or wise; he contended that *a limited number of cases were the better for delaying operation, giving the intestines* complete rest and operating when the general and local condition had improved. This teaching has often been greatly misrepresented, but Ochsner's writings are still worthy of close study. His method has distinct uses *but definite limitations. My present practice* is to delay operation only in two classes of cases —when there is a distinct lump which is tending to localize, and when with extensive peritonitis the condition of the patient—dehydration and signs of circulatory failure—points to the need for improving the general condition. The pathologic process is limited by giving complete intestinal rest and by chemotherapy, and operation is done as soon as considered safe.

The treatment of cholecystitis has changed considerably. First it was the custom merely to drain the gallbladder, later cholecystectomy became almost the routine operation, but later still many surgeons treated acute gallbladder *inflammation by conservative methods* and performed cholecystectomy when the acute symptoms had subsided. If symptoms did not subside, either drainage or removal of the gallbladder had to be done. There is no doubt that in these cases individual judgment and experience play a large part in deciding *on the best method. Chemotherapy should* also be of increasing use in this type of case, and also in the larger field of peritonitis. Forty years ago antiseptics were often introduced into the peritoneal cavity in an irritational manner. Scientific chemotherapy has changed our views. The sulfa drugs and penicillin have greatly improved our chance of combating peritoneal sepsis. They can be introduced locally to deal with a limited focus, or parenterally or by mouth so as to keep up a desired strength in the blood. Penicillin has a special function in cases of pneumococcal and streptococcal peritonitis, while gonococcal peritonitis should almost disappear if the prime focus of the disease is correctly treated.

In treatment of peritonitis the Fowler position has been for many years a useful help.

Of late it has come in for severe criticism by Spalding and others. It is claimed that the position is uncomfortable for the patient, difficult for the nurse to maintain and inefficient in procuring that downward drainage which it is meant to effect. I agree that the bolt upright position is rather uncomfortable and have been accustomed for years to make the patient adopt a position in which the body is at an angle of 45 degrees with the bed. There is no doubt also that it requires a good nurse to maintain any patient in the Fowler position. I am not convinced by the arguments adduced to prove that effusion does not drain from the upper to the lower abdomen.

There have been considerable changes of view concerning the third group of cases—obstructions. First with regard to diagnosis we have learned the value of x-rays. For example, instead of giving an anesthetic to examine an infant with suspected intussusception, we can inject some barium emulsion up the rectum and actually see if there be an invagination, and if it be present we can at least partially reduce it by the same means. We can also see fluid levels and isolated coils of distended small gut, which indicate obstruction. Until a few years ago small gut obstruction was a fatal condition, even though the surgeon was able to relieve the obstruction. The dehydration and loss of salt due to vomiting, the increase in nonprotein nitrogen in the blood and the resulting dangers, the damage incurred by the distended and waterlogged intestine and the sympathetic nervous derangement, not to mention the absorption of toxic substances from the altered contents of the bowel—all contributed to put the patient into a dangerous state. The surgeon used to relieve the obstruction, but was baffled by the distention. According to his view of the pathologic process, he tried stimulation by one of the many drugs available—eserine, pituitrin, pitressin, acetylcholine, magnesium sulfate, administered by mouth, per rectum, intravenously, or actually into the bowel itself. If, on the other hand, he considered the bowel to be exhausted, he would give morphine or operate to perform a jejunostomy. Sometimes he even tried to empty the whole of the small intestine by introducing a large glass tube and passing it through as many coils as possible. A change of view has come lately largely owing to the excellent work and advocacy of Wangensteen. The indwelling duodenal tube and Miller-Abbott modification have lessened the need for more drastic measures. The tired intestine is not so often whipped. Enterostomy is seldom necessary. The use of the Wangensteen technic has been the means of relieving some forms of obstruction without operation. Operation is, however, always necessary in the strangulating form of obstruction.

Another change has been due to the surgeon's appreciation of the need of maintaining the body's fluid balance. It is true that even 40 years ago saline solution was given intravenously in cases of collapse, but there was no true scientific evaluation of the need of fluid, or of the character of the fluid which should be given. Glucose, plasma, hydrolysates, blood, all now have their uses, and the biochemist has come to the aid of the surgeon in estimating which should be given and how much.

One other condition deserves mention—acute dilatation of the stomach. This was at one time thought to be a rare condition, but we now know that minor degrees of it are common. It was at one time taught that it was due to pressure of the superior mesenteric artery on the duodenum, but the dilatation may extend beyond the position of the artery. It appears to be a paralysis of the stomach and duodenum consequent on a neuromuscular derangement. Operative treatment is unwise. It should be treated on the same lines as ileus of the bowel—keep the stomach empty and maintain the body fluids by parenteral administration. In my experience acute dilatation of the stomach is frequently misdiagnosed by surgeons of experience—and misdiagnosis generally spells disaster.

You may ask me what changes of view are likely in the future. We shall no doubt develop the use of antibiotics, and I have little doubt that the future holds the key of the cupboard wherein lie drugs which will combat the various microbes which are still resistant to our present drugs. No doubt also the preventive aspect will be developed; we shall be able to prevent the complications by curing the primary lesion. It is clear, however, that there will be limits to this improvement, and there will always be the need for surgeons skilled in this type of emergency. This remark brings me to the last point I would make. Acute abdominal disease requires for its diagnosis and treatment great accuracy and skill. Upon rapidly made decisions depends the life of the patient. Yet the treatment of these cases is often left to junior and comparatively inexperienced surgeons. So long as this system persists, it is difficult to see how progress can be made. Research in this branch of surgery is, in consequence of this arrangement, irregular, spasmodic and ill coordinated. The remedy for this may lie in the institution in large cities and centers of population of special clinics for the treatment of acute abdominal emergencies. These clinics should be conducted by surgeons of experience, one or more of whom ought to be available at all times of the day or night. There should be a pathologist and bacteriologist always available in the same building. These centers should have a special ambulance service, which could bring urgent cases to the hospital in specially constructed vehicles which would convey the patient without unduly jolting him. In these special clinics young men should be trained and special research should be undertaken. Only when such clinics are instituted shall we get that early diagnosis, quick and comfortable transport to hospital and skilled treatment by well trained and experienced surgeons.

May I now summarize what I have been saying:

The surgeon in my early days was brilliant and keen
He cut acute abdomens just as soon as they were seen
Yet though the operations might be beautifully done
The tables of mortality were such as you would shun.
And when you read of what he did you will not greatly wonder
For many a technique that he used would now be thought a blunder
Exempli gratia—he had faith in that old-fashioned notion
That you could wash the belly clean by gallons of good lotion
Forgetting what he would have seen by more mature reflection
That this was just the very way to spread severe infection.
He soon found man's anatomy was not a mere machine
That function might be failing though no lesion could be seen
But it took years for him to learn that basis of our art
'The whole of man's economy is greater than the part.'
Acute abdomens form a group of very special cases
Perhaps the most important group which day by day he faces
Now often done by those who still experience are gaining
Their treatment really calls for special skill and years of training.
The present state might oft deserve hard comments from the cynic
For what we need are some well-staffed acute abdomen clinics.
My colleagues, one last caution now on you I would bestow
Don't think that you and I have learnt all that there is to know.
Observe, record, attempt, reflect on everything you see
And do not think that present views for evermore will be;
So on all doubtful problems pray preserve an open mind
For he who keeps his eyes close shut is blameworthy and blind.

Zachary Cope

ROME INTERNATIONAL ASSEMBLY

May 18-23

Policlinico, Rome, Italy

Preliminary Program

MEETING OF THE HOUSE OF DELEGATES: Opening Session, *Sunday,* 10 a.m., May 16. Final Session, *Monday,* 10 a.m., May 17. At the Policlinico.

FIRST DAY, *Tuesday, May 18:* The Assembly will open officially at the Campodoglio with a formal reception tendered by the Mayor of Rome and will be attended by officials of the Government.

11:30 a.m.: Visit to Borrominian Hall of the Biblioteca Vallicelliana to view the exhibit of old surgical books gathered for this occasion from various Italian Government libraries.

3:00 p.m.: Visit to exhibit of Medical Specialties and modern surgical publications and instruments, main hall, Policlinico.

4:00 p.m.: Official opening of the Scientific Sessions at the Policlinico with presentation of papers until 7:00 p.m.

Evening free.

SECOND DAY, *Wednesday, May 19:*

9:30–12:30, 3:30–6:30: Scientific Session.

Evening: Gala performance at the Opera House of Rome.

THIRD DAY, *Thursday, May 20:*

9:30–12:30, 3:30–7:00: Scientific Session. Dinner, followed by a tour of Rome by chartered buses.

FOURTH DAY, *Friday, May 21:*

9:30–12:30, 3:30–6:30: Scientific Session.

Evening: Banquet and Ball in one of the leading hotels.

FIFTH DAY, *Saturday, May 22:* Audience with the Holy Father, followed by Reception tendered by the Ministry of Foreign Affairs in the Villa d'Este.

SIXTH DAY, *Sunday, May 23:* Morning free.

Afternoon: Concert in the Argentina Theatre, conducted by Signor Issay Dobrowew.

Announcements of clinics and operations scheduled for Assembly Members will be available in Rome.

The United States Government, through its Bureau of Medicine and Surgery, is sponsoring an exhibit on "Highlights of Military Surgery in World War II." This exhibit will be in the charge of Commander Robert V. Schultz (MC) USN, of Washington, D. C.

A program of the entertainment planned for the families of visiting surgeons also will be available in Rome.

THREE "SURGICAL DAYS" IN TURIN

May 27, 28, and 29

Three "surgical days" in Turin are planned for May 27, 28, and 29. These are Memorial Days arranged by the University of Torino in memory of the great leaders in Italian surgery—Professors A. Carle, M. Donati and O. Uffreduzzi.

Those wishing to participate in these Scientific Sessions and the entertainment planned, will leave Rome with their families by chartered buses. En route, stops will be made at Assisi, Perugia and Arezzo, with an overnight stop in Florence. The party will leave Florence May 26, partake of lunch in Rapallo, stop in Genoa and reach Turin that evening.

A splendid schedule of scientific papers and surgical clinics is being prepared. In addition, there will be receptions, dinners, sightseeing tours, excursions, dancing, concerts, for the entertainment of the Assembly members, their families and visitors. A Ladies Committee, commanding all foreign languages, will welcome and plan for the diversion of wives and guests of Assembly members.

Preliminary Partial List of Speakers at the Scientific Sessions

Fernand Carcassonne (Marseille)
Marcel Darcissac (Paris)
Raymond Darget (Bordeaux)
C. Bélère (Paris)
Carlo Bortolotti (Trieste)
Luigi DiNatali (Milan)
Salvatore Donati (Verona)
Ubaldo Fontana (Turin)
M. Margottini (Rome)
Federigo Rabboni (Palermo)
Bernando Roccia (Turin)
Rosselli G. Sanvenero (Milan)
Raffaele Zanoli (Genoa)
G. Bendandi (Rome)
E. Ruggieri (Rome)
Lawrence Abel (London)
Hamilton Bailey (London)
McNeill Love (London)
E. Farquharson (Edinburgh)
A. J. McCurrich (Brighton)
Richard Perritt (Chicago)
Elmer L. Henderson (Louisville, Ky.)
M. Oldfield (Leeds)
N. Tanner (London)
F. Visalli (Rome)
Felix Mandl (Vienna)
J. B. Pennybacker (Oxford)
Rudolf Demel (Vienna)
H. Milwidsky (Jerusalem)
John Hertz (Copenhagen)
Gyula Langer (Budapest)
Paul Martin (Lausanne)
Albert Berg (New York)
Harry E. Bacon (Philadelphia)
Joseph Berkson (Mayo Clinic)
Rudolph Nissen (New York City)
Custis Lee Hall (Washington, D. C.)
Morris Fishbein (Chicago)
D. M. Gasul (Chicago)
Otto A. Engh (Washington, D. C.)
Raymond W. McNealy (Chicago)
Roland M. Klemme (St. Louis)
Lyon H. Appleby (Vancouver)
Herbert Acuff (Knoxville, Tenn.)

During the Assembly in Rome, in addition to the wealth of national art, there will be on view an exhibit of the Quadriennale d'Arte comprising painting and sculpture.

CHAPTER NEWS

THE ITALIAN CHAPTER

Beginning with the recent inauguration of the Italian Chapter of the International College of Surgeons, the JOURNAL will publish abstracts from the "Bollettino e Memorie della Societa Piemontese di Chirurgia," a publication which is now the official one of the Italian Chapter. This department of the JOURNAL will be under the Editorship of Dr. Carlo Scuderi, assisted by Dr. Peter Rosi and Dr. Arthur Cipolla. Dr. Scuderi is a Chicagoan, graduated from the University of Illinois College of Medicine and specializes in orthopedic surgery. He is a certified member of the American Board of Orthopedic Surgery, Professor of Surgery at Cook County Graduate School of Medicine and Associate Professor of Surgery at the University of Illinois College of Medicine. He is a member of the following societies: Chicago Surgical Society; Chicago Orthopedic Society; Chicago Medical Society; Chicago Society of Industrial Physicians and Surgeons; American Academy of Orthopedic Surgery; Clinical Orthopedic Society; Western Surgical Society; American College of Surgeons and the International College of Surgeons. During the war he served as Colonel in the Medical Corps of the Army of the United States.

Dr. Scuderi plans to publish a section of abstracts from original articles appearing in the Bollettino in the JOURNAL, so that American readers may become familiar with the work going on in Italy. He presents the following announcements by Prof. A. Mario Dogliotti, President of the Italian Chapter of the International College of Surgeons.

"Translated abstracts of articles from the 'Bollettino e Memorie della Societa Piemontese di Chirurgia,' Organo Ufficiale della Sezione Italiana dell 'International College of Surgeons,' Vol. XVII No. 1-2-3-4, 1947. With this number, the first part of Volume XVII, the 'Bollettino della Societa Piemontese di Chirurgia' becomes also the official publication of the Italian Section of the 'International College of Surgeons.'

"In addition to the meetings of the 'Societa Piemontese di Chirurgia,' the publication of its

Dr. Carlo Scuderi, F.I.C.S.

works, the communications of the society and the meetings of the society, the bulletin will be open to all the members of the International College of Surgeons for the publication of their papers and will also bring to them all official notifications and acts of the College.

"The initial activities of our section are promising. More than 100 surgeons of all parts of Italy have already expressed their desire to join, and in most instances have been accepted by the Executive Committee of the College.

"Preparations are already being made for the Spring of 1948, at which time the bi-annual General Congress of the International College of Surgeons will be held in Rome. The last Congress was held in Lima, Peru, and it met with great success.

"The Italian surgeons, and above all the members of the International College of Surgeons, should feel very proud that the first Congress held in Europe after the war will be held in our homeland. All should feel obligated to collaborate with the President's Committee, and the Arrangement Committee, to publicize the College, and gather around us a sufficient number of colleagues to guarantee the success of our project.

"We maintain that the work of our section could not be initiated with a more vast program and a more promising one than the one in the [illegible]

"The Italian Section sends its very best wishes [illegible] colleagues and all the National Sections of the International College of Surgeons.'"

By-Laws of the Italian Section of the "International College of Surgeons"

Article I

The Italian Section of the "International College of Surgeons" is being founded for the study and diffusion of the art and science of surgery, in cooperation with the principles of the Italian Surgical Society and Italian surgeons throughout the various countries of the World.

Article II

This section is composed of two classes of members:

1. Affiliates.
2. Regular members.

Article III

The qualifications of an affiliate are:

A specialist in one of the surgical branches, professor of surgery or a two years assistantship in a first class hospital. The minimum age of this group is 32 years. In other cases the Executive Board will render a decision.

Article IV

The qualifications of a regular member are:

Associates of surgical clinics and university institutions, directors and professors of hospitals, professors of pathological surgery and clinical surgery at the universities and those who have a minimum age of 40 years. In other cases, the Executive Board will render a decision.

Article V

Application for membership must be submitted in duplicate, and must contain the qualifications of the candidate. The qualifications will be examined by a board for election, appointed by the Advisory Committee. Each applicant must have the endorsement of two regular members, and two well-known surgeons of his locality.

Article VI

Through the benevolent action of the Board of Trustees of the International College of Surgeons, there will be no initiation fee for those who become members in the 1947–48 sessions.

Article VII

Annual dues for the affiliate members is L2,000 and for the regular members L4,000.

Article VIII

All affiliate and regular members have the right to receive: The Bulletin of the Piemontese Society of Surgery, which at the present time is the official publication of the Section; The Journal of the International College of Surgeons; a diploma of the International College of Surgeons. All members may participate in the meetings of the Italian Section and the international reunions, and they may publish their papers in the Bulletin of the Italian Section or the Journal of the International College of Surgeons.

Article IX

Only regular members can be elected to the Governing Body, with the exception of Secretary and Treasurer. Only the regular members have a right to vote, and all voting will be by secret ballot.

Article X

All affiliate members who have qualified for regular membership may ask for transfer to the higher group; otherwise they automatically become regular members after three years.

Article XI

The Board of Directors is composed of one president, two vice presidents, four counsellors, one treasurer and one secretary.

Article XII

The Board of Directors will be elected for a two year term. The president cannot be reelected except after a lapse of two years.

Article XIII

The Board of Directors will nominate the Committee on Admissions and the official delegates to the International Congress. It will also nominate a Judiciary Committee for the study of scientific papers prior to publication.

Article XIV

The duties of the secretary are, to take care of all correspondence, publish news of the meetings, supervise the library and perform such other duties as designated under the by-laws.

Article XV

The duty of the treasurer is to give a detailed report of the finances of this Section of the College each year.

Article XVI

Any changes of the present by-laws may be proposed by the Board of Directors, or by a group of members constituting not less than one quarter of the total members, and must be passed by not less than two-thirds of the members present.

Formation of the Austrian Chapter of the International College of Surgeons is now complete. The Chapter was formally established on Nov. 14, 1947, with Prof. Dr. Wolfgang Denk as President, Prof. Dr. Hans Finsterer as Vice President and Prof. Dr. Felix Mandl as Secretary. They and Prof. Dr. Rudolf Demel of Vienna comprise the board at the present time, and they are concerned with the selection of members for the Chapter.

The Finnish Chapter *held a meeting in Helsinki* on Sept. 27, at which Dr. Kivimäki read a paper on "The Surgical Treatment of Deformities of the Jaws," illustrated by many photographs. Dr. Kallio discussed a case of arthrogryphosis multiplex congenita, emphasizing the fact that no improvement could be obtained in this case with any type of therapy.

Dr. Kallio, who is secretary of the Finnish Chapter, has recently been visiting medical centers in the United States.

The following Fellows of the **Mexican Chapter** were appointed official delegates to the Third International Congress of Ophthalmology, which took place in Habana, Cuba, from Jan. 4-10: Prof. Dr. Raul A. Chavira, representing the National University of Mexico and the Ministry of Health; Prof. Dr. Antonio Torres Estrada, Vice President of the Mexican Chapter; Prof. Dr. Feliciano Paolomino Dena, President of the Mexican Society of Ophthalmology; Prof. Dr. Carlos Malabchar Pena, delegate of the Society of Health.

Prof. Dr. Francisco Fonseca, F.I.C.S.(Hon.), was recently elected permanent Director of Publications of the Mexican Academy of Surgery, and Prof. Dr. José Martínez, F.I.C.S., was elected Honorary President of the Society of Gynecology and Obstetrics of Monterrey, Mexico. Prof. Dr. Xavier Romo Diez, F.I.C.S., was elected President of the Society of Traumatology and Orthopedics of the Mexican Institute of Social Security.

Prof. Dr. Oscar Guzman del Villar, of the **Peruvian Chapter**, is a member of the Peruvian delegation to the UNESCO conference, which met in Mexico City recently.

Prof. Dr. Edmundo Murray, of the **Argentine Chapter** of the International College of Surgeons, was elected Member of the Argentine Society for the Study of Sterility.

GENERAL NEWS

UROLOGY AWARD

The American Urological Association offers an annual award of $1000.00 (first prize of $500.00, second prize $300.00 and third prize $200.00) for essays on the result of some clinical or laboratory research in Urology. Competition shall be limited to urologists who have been in such specific practice for not more than five years and to residents in urology in recognized hospitals.

The first prize essay will appear on the program of the forthcoming meeting of the American Urological Association, to be held at the Hotel Statler, Boston, Massachusetts, May 17–20, 1948.

For full particulars write the Secretary, Dr. Thomas D. Moore, 899 Madison Avenue, Memphis, Tennessee. Essays must be in his hands before March 1, 1948.

The U. S. Army Medical Department announces the availability of opportunities for advanced training and experience in the various special fields of medicine and surgery in overseas Army hospitals. These hospitals are registered with the American Medical Association, and this training may be acceptable by the specialty board as part of the period usually required to be spent in limited practice and experience prior to admission for examination. Interested members of the medical profession who have completed the formal training requirements for certification in one of the special fields are eligible to apply for these positions. On Jan. 1, 1948, the following opportunities were available, and will be kept open until filled:

Specialty	No. of Openings
Eye, Ear, Nose & Throat	7
Obstetrics & Gynecology	14
Anesthesia	7
Ophthalmology	3
Otorhinolaryngology	3
Neurosurgery	1
Orthopedic Surgery	5
Thoracic Surgery	1
Plastic Surgery	1
Radiology	11
Internal Medicine	24
Dermatology	3
Neuropsychiatry	15
Pediatrics	10
Cardiology	2
Pathology	1

[illegible] 21 positions in general surgery [illegible] in urology, but these boards [illegible] practice" and it has not yet been determined whether or not the hospitals will be approved by these boards. However, full approval of these specialties is being sought and inquiries are invited.)

Positions offered will be in the following hospitals:

Name	Location	Bed Capacity
97th General Hosp.,	Frankfurt, Germany	1000
98th General Hosp.,	Munich, Germany	1000
110th Station Hosp.,	Vienna, Austria	150
120th Station Hosp.,	Beyreuth, Germany	325
124th Station Hosp.,	Linz, Austria	150
130th Station Hosp.,	Heidelberg, Germany	250
250th Station Hosp.,	Regensburg, Germany	150
279th Station Hosp.,	Berlin, Germany	350
317th Station Hosp.,	Wiesbaden, Germany	150
319th Station Hosp.,	Bremerhaven, Germany	600
385th Station Hosp.,	Nurnberg, Germany	350
387th Station Hosp.,	Stuttgart, Germany	453
388th Station Hosp.,	Giessen, Germany	250

These locations provide excellent facilities and equipment, a wealth of clinical material and the services of visiting consultants who are outstanding specialists in the various fields of medical practice. In addition, opportunities will be afforded to observe the work of notable scientists and physicians in German and Austrian Universities.

The applicant may avail himself of this training for periods of one, two or three years. Those applicants who are selected, and who hold reserve commissions in the Medical Corps, will usually be recalled to active duty in the highest grade attained prior to release from previous active service. Those who do not hold such reserve commissions will be tendered a reserve commission in the Medical Corps in keeping with their age, years of professional experience and prior service in any branch of the Armed Forces. Prior military service is not required. Individuals who are members of the U. S. Naval Reserve must transfer to the Army Reserve before being called to active duty. Families of married applicants will be allowed to accompany them to the place of duty. Suitable quarters are available. Families of individuals who do not declare their desire to serve for periods to exceed one year cannot be transported at Government expense.

Eligible physicians are invited to communicate with the Surgeon General, U. S. Army, Washington 25, D. C., for further information.

Inquiries should include the following information: a. name; b. address; c. age; d. nationality; e. marital status; f. dependents with age of each; g. medical school and graduation date; h. internship and date; i. details of graduate training;

Dr. Roman receiving diploma "a Benemeritus" (native son) and decorations from the municipalities at the ceremony in which one of the principal avenues of his native city of Jinotepe was renamed.

The Honorable Rector of the National University of Nicaragua in León, conferring upon Dr. Roman the degree of "Rector-Honorario" of the university, January 5, 1948.

j. specialty and geographic location desired; k. contemplated length of service; l. details of prior military service.

PALMAN QUI MERUIT FERAT

It is a pleasure to be able to record that Dr. Desiderio Roman, Past President and Member of the International Board of Trustees of the International College of Surgeons, continues in the prime of his activities, collecting honors as naturally as a plant absorbs sunlight.

Dr. Roman is an American citizen and has spent much of his life in the United States. Nevertheless, Nicaragua is proud of her native son and loses no opportunity to do him honor.

Such an opportunity was offered recently when Dr. Roman visited his native country after an absence of fifty years. Originally planned to be a quiet, private family reunion, the visit passed beyond control of the family and became the occasion of public ceremony and bestowal of honors Dr. Roman was met on his arrival at the airport by at least 600 persons, among them being not only public officials of the several branches of the Government, and members of the faculties of Medicine and Surgery of the Universities of Granada and Leon, but of old friends and classmates as well. Thereafter Dr. Roman's visit became a tour of welcoming cities where ceremonies of welcome were carried out in accordance with ancient tradition and custom.

In Jinotepe, Dr. Roman's birthplace, his arrival was announced symbolically by the Diana Trumpeters and a Te Deum was sung in the Temple. To perpetuate his name in his native city an avenue was renamed "Avenida del Doctor Desiderio Román-Reyes" in an appropriate ceremony.

The University of Granada, of which Dr. Roman is an alumnus, conferred upon him honorary degrees of Doctor of Medicine and Surgery and Doctor of Laws. The University of Leon, which takes pride in being the oldest institution of learning in Central and South America, in an impressive ceremony paid Dr. Roman the honor of electing him Rector-Emeritus (honoris causa).

Dr. Roman is amply deserving of these evidences of appreciation by his native land. His charming personality is fortified by culture and refinement and his professional philosophy is rooted in idealism and guided by his humanitarian heart. The International College of Surgeons is fortunate to have had in him a pillar of its structure since its inception.

The Officers and the International Board of Trustees of the International College of Surgeons congratulate Dr. Roman upon these honors so well deserved, and extend the hope that he will continue his splendid activities *ad multos annos!*

NEW BOOKS

Williams & Wilkins are noted for excellent publications. On the back of the jacket of the book to be reviewed now appear such eminent names as Bailey, McGregor, and Wakeley, names of top rank in contemporary surgical endeavor. But in perusing the work of **Oliver C. Cox** on Practical Incisions and Some Operative Procedures, which the jacket encloses, one is impressed with a terrific anticlimax. It is regrettable that this book has been published, for the paper and binding could have been used for a much better purpose in these stressful times of paper shortage. The humblest and most abbreviated text on surgery contains more information about incisions than this Atlas of 85 pages, a small part of which is devoted to incisions. Text and explanatory matter are practically nonexistent. The author begins on Page 3, showing the incision for exposure of the gallbladder. It is a transverse incision; nothing is said as to who originated this incision or how it is to be done. On Page 6, for no good reason, a few steps for classical cholecystectomy are shown. Why this should have been inserted here is puzzling to this reviewer. It depicts the isolation of the cystic duct and cystic artery. This is followed by three plates of the upper abdomen, presumably showing where the incision was made, but in the final analysis showing nothing.

The incision for appendectomy is next taken up with a brief note which states "This incision is made near the iliac spine, out of a crease and with the lines of the skin. It may vary from one to two inches in length depending on the obesity of the patient. In the majority of cases nothing but a Kelly clamp need be introduced into the abdomen, delivering the appendix with two clamps as illustrated. . . ." What the reader can glean from such a description is beyond the conception of this reviewer. Again eight illustrations show the exposed lower abdomen, presumably to illustrate something, but again nothing is found. Whether the retouching pencil has been used here, this reviewer is unable to state. In some instances such statements as "the illustrations are self-explanatory" are furnished, but since there are no legends, the illustrations explain nothing.

The Pfannenstiel incision receives the same treatment. In an explanatory line or two the author says that "hematosis" is important; he evidently meant "hemostasis." Here also the illustrations have no legends, and the inevitable photographs of five exposed lower abdomens show nothing but pubic hair.

The gridiron incision is unmercifully maltreated, and the five lines allotted to it, with one picture, are absolutely valueless. That holds true for the illustrations for hernia incisions and for the nine photographs of exposed abdomens. Only one, Figure 23, shows signs that an operation has been performed.

The author then mentions the excisions of pilonidal cyst and admonishes not to remove any skin. He supplies next four illustrations on circumcision, and all the reading material pertaining to it is "No explanation is necessary. The drawings are adequate to show the simple procedure." For a beginner this is a very dangerous admonition, and the advanced surgeon gets little out of perusing the pictures.

Why the author should choose for his closing contribution (No. X) "The Parker-Kerr Aseptic Enteroenterostomy" cannot be explained. Not a line of information, nothing about incisions, but four pictures about the operation . . .; there seems to be no rhyme or reason for this. This is followed by three blank pages, symbolizing to this reviewer the value of the book

With the paucity of paper, with the hardships of printing conditions, it is a pity that this book was permitted to leave the press, when it contains no informative material, has no didactic value and displays nothing else but the fine paper the publishers are using and the fine books by Bailey, McGregor and Wakeley, which are advertised.

Dr. Elliott must have heard the wail and cry of the medical student as he struggles to understand the subject of neuro-anatomy. The author has written a textbook for this group and for any one who desires a basis for clinical neurology. The book has departed somewhat from the usual path in the manner of presenting this subject. The method utilized here has resulted in a clear account and

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Atlas of Practical Incisions and Some Operative Procedures. Oliver C. Cox, M.D. The Williams & Wilkins Co., Baltimore, 1947. 85 pp., 61 plates, 27 figures.

[illegible] Nervous System. H. Chandler Elliott, Ph.D J. B. Lippincott Co, Philadelphia, 1947. 158 ill, [illegible] a well organized presentation. It is easy to read and yet one gains a very accurate and lasting comprehension of the presented subject.

It is easy to see that the data presented are the result of repeated lectures on the subject to dazed and weary medical students. The author has spared no effort to make it easy for any one who wishes to gain a basis for clinical neurologic interpretation to acquire this by study of his book. The book is very well illustrated with color drawings which greatly aid in the understanding of this subject. There is also an atlas of neuro-anatomic photographic plates, showing dissection of the brain. Accompanying these plates are diagrammatic sketches illustrating the photographs. These are very effective in orientation by the reader

The book is divided into three parts. The first is an elementary discussion of the nervous system. This is clear, brief and yet adequate enough to give a lucid basic picture of the system as a unit and its interrelationships. Part 2 rounds out and fills in the outline form of Part 1. This section deals with all the various parts of the nervous system and goes into adequate detail for an advanced student. This is aided by the excellent illustrations which are very neatly and accurately integrated. This portion of the book discusses much more than mere anatomy of the neurologic apparatus, for it also presents the reader with an excellently clear description of the physiology of the various reactions of the nervous system. Part 3 consists of an atlas The plates show various gross dissection and transverse sections of the brain and the brain stem. There are clear illustrations accompanying each photograph.

Dr. Elliott had admirably succeeded in accomplishing his aim: "to present the subject of neuroanatomy and neurophysiology in a way suggesting the psychology of learning."

This book* provides a text planned to facilitate the acquisition of general information, to indicate further and richer sources of knowledge of cancer, to describe the clinical evolution and the differential diagnosis which are most useful to the nonspecialized worker, and to present an integrated view of all the various aspects of cancer as a basis for a complete understanding.

The first part of this book is dedicated to subjects of general interest and application in the field of malignant neoplasms. It contains a chapter on cancer research contributed by Michael B. Shimkin of the National Cancer Institute. Another chapter on the surgery of cancer, edited by Eugene Bricker of the Washington University School of Medicine and the Ellis Fischel State Cancer Hospital, describes the general considerations surrounding the surgical care and treatment of cancer in general. Similarly, radiotherapy of cancer is then discussed including the physical foundation of this means of therapy, its biologic effects, its radiophysiology, indications for treatment, the technical aspects and the clinical control of this powerful means of treatment.

The section on pathology is very thorough. The discussion includes the various forms of biopsy, the preparation and study of solid specimens with staining methods, the examination of fluid specimens including sputa, urinary sediments and vaginal smears, etc., the technic of frozen section and tissue culture and hormone studies. The gross description of surgical specimens includes the invasion by the lymphatics and blood vessels and the form and direction of the spread of cancer The microscopic description of surgical specimens includes the differentiation between benign and malignant tumors, the transformation of the former into the latter, the description of the various forms of neoplasia and the method and value of grading. The consideration of the general properties of malignant tumors and their biologic factors, the occurrence of multiple tumors and the correlation of morphology with radiosensitivity complete this section. Throughout, special attention has been given to gross pathology because of its clinical and surgical importance; microscopic structure has been rather briefly described except where deemed necessary by the authors.

The text of the rest of the book is divided for consideration into the major systems: the digestive system, the respiratory system, the urological system, etc.—and the discussion of them is made according to their individual anatomy and physiology. There is a chapter on the borderline Hodgkin's disease and one on leucemia. The subdivisions and their discussions are minutely and thoroughly carried out. Throughout, the term cancer is employed to indicate any form of malignant neoplasm; the term carcinoma is used exclusively for neoplasms of epithelial origin and the word tumor is used in a general undifferentiated way for all forms of neoplasia and whenever the subject matter justifies a joint consideration.

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* *Ackerman and del Regato: Cancer—Diagnosis, Treatment and Prognosis.* By Lauren V. Ackerman, M.D., and Juan A. del Regato, M.D. 1115 pages, with 745 text illustrations and 42 color reproductions. The C. V. Mosby Company, St. Louis, 1947.

In each of these individual discussions, the text follows the following headings: anatomy, incidence, etiology and pathology—all integrated in much needed and interesting sections on the clinical evolution of the given lesion; diagnosis; the general form and plan of treatment without going into too many details; and the prognosis. In discussing the treatment of the many individual lesions, indications and contraindications for operation are detailed as well as the dangers and complications which are apt to follow surgical intervention. This is well illustrated in the discussion of the surgical removal of carcinomas of the pancreas. Many illustrations accompany and follow this arrangement.

The anatomic description of the various organs or regions emphasizes any pertinent details Frequently this description is somewhat incomplete from a purely anatomic point of view, but there is a more detailed discussion of the lymphatics than is usually found in textbooks of anatomy because of their unquestionable importance in cancer. Here the writers have borrowed freely from Rouviere's monograph "Anatomie des lymphatiques de l'homme."

Data concerning incidence and etiology, comprising whatever available relevant information there is, are purposely short to avoid repetitions and unnecessary discussions. Details of the clinical evolution of cancer and of the relationship of symptoms to individual lesions should help clarify prognostically the expected course of the disease and should facilitate earlier and better diagnosis.

The pertinent factors and required examinations which lead to the recognition and identification of a given tumor are combined with remarks concerning the differential diagnosis in those which most frequently offer a problem of diagnosis. Rare tumors not justifying a special chapter are detailed when they are considered in the differential diagnosis of other tumors.

The various forms of treatment and of therapeutic technics which are described are geared for the general practitioner. These receive greater attention that those which belong, perhaps, more to the specialist; the latter receives less attention. Nevertheless, all forms of treatment are discussed, and a treatment of choice is presented which seems best to the authors. This, however, is left open for discussion by them, and at the same time, they remark that the introduction of a new technic or progress in the application of present ones may cause a revision of these opinions at any time The use of testosterone in treatment of certain forms of cancer receives only passing mention.

The authors' ideas of prognosis are predicated on the statistics of results; but only serious, well controlled statistics, preferably of patients followed at least five years, are quoted. This point is well taken, and the reviewer agrees with the authors that in many cases such information is greatly needed, because the general practitioner has been too much impressed with the hopelessness of certain forms of cancer and is unaware of the relatively great possibilities of adequate treatment.

The book is well documented. At the end of each section there is a list of the works referred to in the text. These references provide a source for further study and information for the specialist or the more serious student.

The text is accompanied by 76 tables and 745 illustrations, including clinical photographs, photographs of gross specimens, photomicrographs and drawings. The quality of most drawings, which greatly enhance and clarify the written word, is a credit to Virginia Svarz Ackerman, and the clarity of the photomicrographs and many of the photographs are the result of the technical ability of Mr. J. F. Barham.

As books go this is a large book, full of detailed clinical knowledge of an encyclopedic kind, but lacking in certain special fields, like surgical technic and postoperative treatment, and short in some sections, like that devoted to research. One may not find fault, however, with the fact that the length of some of the chapters of this book is sometimes neither commensurate with the importance of the subject nor with the incidence of the tumor under consideration, because the authors have made this disparity deliberately, correctly guided by the relative undesirability of information on certain rare subjects and by the necessity of greater knowledge on some aspects of the more curable forms of cancer. Important recent developments have also received priority on space Nevertheless, the book is excellent and well suited to the student and the general practitioner and clinician, whose function is the early [illegible] of all forms of neoplasia and their subjection to adequate treatment by the specialist at as early a period as is possible. For this purpose the book is highly desirable and fills a distinct need.

The book is well made; the type is easy to read: the illustrations are well reproduced and [illegible] spaced The entire format is pleasing and the publishers should be congratulated [illegible] the job so well.

Original Articles

A Clinical and Physiologic Evaluation of Vagotomy in the Treatment of Peptic Ulcer[*][†]

I. F. STEIN, JR., M.D.[**] AND KARL A. MEYER, M.D.
CHICAGO, ILLINOIS

VAGOTOMY in the treatment of peptic ulcer has received widespread interest since the introduction of complete vagotomy by Dragstedt and Owens in 1943.[1] The previous literature has been reviewed[2, 3] and indicates that incomplete vagotomy is of little if any value in the treatment of peptic ulcer.

In June, 1946, a clinical and physiologic evaluation of vagotomy was started at the Cook County Hospital. Subsequently, vagus section was performed on 35 peptic ulcer patients.[4]

The patients selected for this study exhibited very severe ulcer diathesis, were from a low income group and often presented multiple complications. Such a group was chosen as a rigid test of vagotomy. There was a total of 53 previous complications in the 35 patients. Previous gastric surgery had been performed in 19 patients and the procedures included five gastric resections, five gastroenterostomies, and 16 instances of repair of a perforated peptic ulcer. Previous bleeding had occurred in 19 cases, 10 of which had massive hemorrhage, and 6 had pyloric obstruction, 3 of which were complete. Repeated attacks of severe epigastric pain were present in 31 of the 35 patients and in 12, the pain was intractable. The duration of symptoms ranged from 1 to 36 years with an average of 11 years. In all cases previous medical or surgical management had failed to give permanent relief of symptoms.

Duodenal ulcer was present in 26 patients and marginal ulcer in 8 patients. One patient had a prepyloric ulcer shown to be benign by biopsy at the time of closure of a perforation, two months before vagus section. This was the only gastric ulcer in the series.

METHOD

The thoracic approach, as described by Dragstedt and Schafer[5] was employed in the first 9 cases. A 2 to 3-cm. portion of the nerves was resected approximately 6 cm. above the diaphragm. No attempt was made, however, to remove the distal branches of the vagi extending to or below the diaphragm as described by Dragstedt[5] and Moore.[6]

The abdominal approach as described by Dragstedt[7] has been employed in the remaining 26 cases and is preferred for the following reasons:

1. Exploration of the gastrointestinal tract allows examination of the viscera, for confirmation of diagnosis and for other intra-abdominal pathology.
2. The site of the ulcer may be examined and if marked scarring is present, a simultaneous gastroenterostomy is performed to prevent gastric retention.
3. The patients have a quicker convalescence and less postoperative discomfort.
4. The percentage of cases having incomplete vagotomy will not differ greatly whether the thoracic or abdominal approach is used, provided a careful search is made for all vagus fibers in the region of the diaphragm.[8, 9, 10]

CLINICAL RESULTS

In general, clinical results have been excellent. Following surgery, all patients had immediate relief of ulcer symptoms and pain. Thirty-one of the 35 patients are now leading an unrestricted life for the first time in many years. Ulcer management, including dietary and medical treatment, has been eliminated completely. Satisfactory weight gain took place in 30, and 31 patients expressed themselves as being well satisfied with the results. The majority of patients had been constipated before vagotomy, whereas postoperatively, most of them had one or two soft bowel movements a day. Troublesome diarrhea occurred in two patients, but this disappeared spontaneously after two months. The most striking results, from the standpoint of complete relief of intractable pain, have occurred in 8 patients with marginal ulcer.

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[*] From the Hektoen Institute for Medical Research of the Cook County Hospital and from the Departments of Surgery of the Cook County Hospital and Northwestern University Medical School, Chicago.

[†] Read before the Twelfth National Assembly, United States Chapter, International College of Surgeons, Chicago, Sept 29–Oct. 4, 1947.

[**] Abbott Fellow in Surgery, Northwestern University Medical School

COMPLICATIONS

One patient died on the eighth postoperative day due to lower nephron nephrosis, uremia, and cardiac failure which followed a blood transfusion reaction. Recurrence of ulcer symptoms with positive x-ray evidence of peptic ulcer occurred in 4 cases. One patient developed acute gastric retention and dilatation on the tenth postoperative day which was treated effectively by gastric lavage followed by the administration of doryl.[11] This patient had a persistent, foul belching which lasted five months in spite of treatment with doryl or urecholine. These foul eructations have ceased and the patient is entirely asymptomatic.

In three patients, cardiospasm was noted about two weeks postoperatively. The dysphagia, substernal discomfort and regurgitation of food was spontaneously relieved in from one to three weeks.

One patient had loss of appetite with a failure to gain weight, and one patient had occasional vomiting. One patient, who had an excellent clinical result, was re-admitted to the hospital three months after vagus section with a bronchopneumonia from which he died. Autopsy showed the pneumonia to be unrelated to the previous vagotomy.

The most frequent and disturbing complication was gastric retention and distention. [illegible] this has been effectively controlled by the use of a gastroenterostomy if pyloric obstruction was present, by careful postoperative management,[4] and by the occasional use of doryl or urecholine.[11]

INSULIN TEST

Incomplete vagotomy is not expected to cause permanent healing of a peptic ulcer, and therefore each patient subjected to vagus section should be tested to ascertain whether the nerves have been completely sectioned. Insulin provokes increased gastric motility and secretion by hypoglycemic stimulation of the vagal center. This action is abolished by complete vagotomy. Our procedure is described in detail elsewhere.[3] The patient is fasted all night and the basal secretion and motility are determined in the morning for a period of at least one hour. Then 15 units of regular insulin are injected intravenously and the effect on gastric secretion and motility are noted for 1½ to 2 hours. Preoperatively, and postoperatively, if vagus section has been incomplete, there will be a sudden marked rise in free acid output following the hypoglycemia, and spontaneous or insulin induced hunger contractions will be present in the fundus of the stomach. After complete vagotomy there will be no acid response following insulin hypoglycemia and no spontaneous or insulin induced contractions in the fundus of the stomach. Of 30 patients tested by this method, 5 had incomplete vagus section, 2 were doubtful and one had return of vagal function after nine months—a total of 8 having doubtful or incomplete vagotomy. Four of these patients have had recurrence of ulcer symptoms.

CHANGES IN GASTRIC FUNCTION

Studies of gastric function were made on the majority of the patients before and after vagotomy, and have been reported in detail elsewhere.[12] The preoperative average of the 12-hour night secretion of 70 determinations in 22 patients was 47.4 milliequivalents (mEq) of free acid per 12 hrs. (Table 1). After complete vagotomy the average of 51 determinations of the night secretion in 18 patients was 1.9 mEq/12 hrs. This is a decrease of 96 per cent. The basal secretion was determined after 16 hours of fasting. The stomach was aspirated continuously and samples of gastric juice collected at 15-minute intervals for titration. (This fractional method of gastric analysis was also used in the insulin, histamine and caffeine tests.) The preoperative average of 56 determinations of the basal secretion in 22 patients was 3.7

TABLE 1. 12-HOUR NIGHT SECRETION AND BASAL SECRETION BEFORE AND AFTER COMPLETE VAGOTOMY

	Free Acid		Decrease Per Cent
	Before	After	
12-hour night secretion	47.4 mEq/12 hr. (70 determinations in 22 patients)	1.9 mEq/12 hrs (51 determinations in 18 patients)	96
Basal secretion	3.7 mEq/hr. (56 determinations in 22 patients)	0.2 mEq/hr. (41 determinations in 18 patients)	94.6

mEq hr. (Table 1). Following complete vagotomy the average of 41 determinations in 18 patients was 0.2 mEq hr. This is a decrease of 94.6 per cent.

TABLE 2. EFFECT OF HISTAMINE AND CAFFEINE ON GASTRIC SECRETION BEFORE AND AFTER COMPLETE VAGOTOMY

	Free Acid		Decrease Per Cent
	Before	After	
1.0 mg. histamine (average of 11 patients)	12.7 mEq/hr.	3.6 mEq/hr.	72
0.5 Gm caffeine with sodium benzoate (average of 12 patients)	7.2 mEq/hr.	1.0 mEq/hr.	86

The effect of histamine on gastric secretion was tested on 11 patients (Table 2). The average secretory response to a 1.0-mg. intramuscular injection of histamine was 12.7 mEq/hr. before surgery and 3.6 mEq/hr. after complete vagotomy, a decrease of 72 per cent. All 11 cases of complete vagotomy tested showed a decreased secretory response to histamine, and an achlorhydria was present in two cases.

The secretory response of the stomach to 0.5 Gm. of caffeine with sodium benzoate, administered in water by stomach tube, was determined in 12 cases (Table 2). The average secretory response was 7.2 mEq/hr. before surgery and 1.0 mEq/hr. after complete vagotomy, a decrease of 86 per cent. All 12 cases of complete vagotomy tested showed a decreased secretory response to caffeine and an anacidity following caffeine stimulation was present in 3 patients.

The spontaneous motility of the fundus of the stomach was studied after 16 to 24 hours of fasting.[3, 11] A balloon was placed in the fundus of the stomach and a small amount of air was injected. Recordings were made by means of a water manometer on a slowly moving kymograph. Twenty-seven patients were studied before surgery and in each case spontaneous hunger contractions were noted.

parent that the gastric phase of secretion is to some extent influenced by the vagi.

The beneficial results of vagotomy in the treatment of peptic ulcer cannot be attributed to any single change in gastric function; both periods and all phases of gastric secretion are either partially or completely dependent upon vagus function as is the motor mechanism of gastric hunger contractions. The fact that complete vagotomy is followed by immediate relief of ulcer symptoms, and apparent healing of the ulcer, does not prove that excessive *vagal activity is the cause of peptic ulcer.* Complete vagotomy interrupts a mechanism necessary for chronicity of peptic ulceration, although this mechanism may not be primarily disturbed.

SUMMARY

Thirty-five peptic ulcer patients have had vagus section and have been followed clinically from 5 to 16 months. Clinical results have been excellent except in 5 cases including one postoperative death and 4 recurrences of peptic ulcer. There are marked changes in the gastric secretory and motor mechanisms following complete vagotomy. It is not certain to what extent this altered gastric function is permanent. Little is known of the effect of vagotomy on the other organs innervated by the vagi.

It is still too early to make a final evaluation of vagotomy in the treatment of peptic ulcer. Until more information is available concerning the incidence of recurrence of ulcer distress and the possible late sequelae, the use of vagotomy should be limited to clinical investigation with one exception. Complete vagotomy is the method of choice in the treatment of marginal ulcer following gastric resection.

SOMMAIRE

Trente-cinq malades avec ulcères peptiques ayant été soumis à une section ou vagus ont été suivis cliniquement de 6 à 16 mois. Les résultats cliniquax furent excellents exceptés dans 5 cas qui donnèrent un décès postopérative et 4 recidives ulcères peptiques. Il y a des changements marqués de la secretion gastrique et dans le mécanisme gastrique après une vagotomie. Il n'est pas certain si cette alteration des fonctions gastriques soit permanente. Il est encore trop tôt pour faire une évaluation finale de la vagotomie dans le traitement des ulcères peptiques, avant que nous soyons plus renseignés sur la fréquence de la récidive. La vagotomie complète est la méthode de choix dans le traitement des ulcères marginaux suivant la resection gastrique.

RIASSUNTO

La statistica operatoria degli AA. comprende trentacinque casi di ulceri peptiche sottoposti a resezione del vago, seguiti per un periodo di tempo oscillante da 5 a 16 mesi. I risultati clinici sono stati ottimi, ad eccezione che in 5 casi. E cioe': 1 caso di morte per complicazioni post-operatorie, e 4 recidive. Molte variazioni, motorie a secretorie, occorrono nello stomaco dopo una completa vagotomia.

Non siamo ancora in grado di stabilire la durata di queste variazioni. Poco sappiamo inoltre sopra gli effetti della vagotomia negli altri organi innervati dal vago.

E' ancora presto per definire con esattezza un'indicazione precisa della vagotomia nella cura delle ulceri peptiche. Fino a che non saremo in possesso di maggiori dati statistici reguardo la recidiva dei sintomi gastrici ed altri eventuali inconvenienti post-operatori, e' prudente limitare la vagotomia ad un controllo clinico. La vagotomia rimane pero', fin d'ora, un intervento di elezione nei casi di ulceri marginali successive a resezioni gastriche.

SUMARIO

35 casos de ulcera peptica tratados por la sección del nervio vago han sido estudiados clinicamente por un periodo de 5 a 16 meses. De estos casos, 30 han obtenido muy buenos resultados, uno fallecio despues de la operación y los otros cuatro presentaron una reactivación de la ulcera.

La vagotomia produce grandes cambios en la función gastrica. Aun todavia no se puede predecir la permanencia de las alteraciones funcionales resultantes. Poco se sabe de los efectos de la vagotomia en los organos vecinos que son inervados por este nervio.

Todavia aun es muy prematuro el tratar de hacer un juicio final de este metodo de trata-

miento y por lo tanto debe considerarce por el momento como un metodo de investigación clinica. Sin embargo se puede decir que es el metodo de selección en el tratamiento operatorio de las ulceras marginales que ocurren como complicación de las resecciones gastricas.

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The Intervertebral Disk Syndrome*

PHILIP LEWIN, M.D., F.A.C.S.
CHICAGO, ILLINOIS

THE intervertebral disk has been the object of study for several centuries. In 1555 Vesalius described the difference between the consistency of the annulus fibrosus and that of the nucleus pulposus. Virchow made anatomic studies of the intervertebral disk in 1857, and one year later von Luschka accurately described its structure and embryology. Between 1855 and 1880 various writers made contributions to the embryology, stressing the importance of the fetal notochord.

In 1927, Schmorl began his meticulous necropsy studies showing the high incidence (38 per cent) of displacement of the nucleus pulposus into the spongiosa of the vertebral body. Schmorl and Andrae also called attention to the cartilaginous masses found within the spinal canal, consisting of nucleus pulposus herniated through defects in the annulus fibrosus The modern concept of the syndrome of protrusion of intervertebral disk dates from the work of Mixter and Barr, Adson, Love, Craig, Camp, Walsh, Dandy, and Bradford and Spurling.

The first case of intervertebral disk herniation to be described clinically was that of Kocher in 1896. Since 1934 a voluminous literature on the subject has accumulated.

The first published report of a patient operated on for protrusion of an intervertebral disk into the spinal canal was that of Oppenheim and Krause in 1909. Their patient had a complete transverse lesion of the cauda equina at the level of the third lumbar disk. The protruded portion of a disk was removed at operation and the patient recovered. Middleton and Teacher in England, and Goldthwait in the United States reported cases in 1911. Adson performed his first operation for this lesion in 1922. Numerous reports of "enchondromas" appeared between 1911 and 1929. In the latter year Dandy reported 2 lumbar cases and recognized the distinct character of the lesion. Peet and Echols also recognized the lesion about the same time. Schmorl recognized the frequency of protrusions from the disk margins but did not consider them of great neurologic significance.

The interest of Mixter and Barr was aroused in 1932 by the case of a young man with severe intractable sciatica following a fall. They found that about 75 per cent of their enchodromas were not tumors but protrusions of normal disk cartilages. In 1934, they called attention to the fact that unilateral leg pain was the outstanding symptom suggesting a protruded disk. It is remarkable how close many investigators came to discovery of the disk syndrome. This is especially true of Danforth and Wilson and Williams, Ghormley, Putti, Adson, Dandy, Bucy, Goldthwait, Barr and others.

The nucleus is capable of absorbing 16 times its weight of fluid.

VENTRAL EXTRADURAL CHONDROMAS

Formerly, small localized masses extending into the ventral part of the spinal canal opposite the intervertebral disks were considered true neoplasms and were designated by various terms: chondroma, ecchondrosis, fibroma, and fibrochondroma.

Two "chondromas" of the lumbar intervertebral disks were reported by Ott and Adson (1923). In 1928, Elsberg reported 11 "chondromas" involving intervertebral disks, and Stookey reported 7 cases, all cervical. Alajouanine and Petit-Dutaillis recognized that these "chondromas" consisted of the displaced nuclei pulposi of the intervertebral disks. The report by Elsberg of 15 patients with "chondromas" proves the similarity between certain parts of the intact intervertebral disk and the "chondroma." Kocher (1896) recorded the first account of traumatic rupture of the intervertebral disk.

Middleton and Teacher (1911) reported

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miento y por lo tanto debe considerarce por el momento como un metodo de investigación clinica. Sin embargo se puede decir que es el metodo de selección en el tratamiento operatorio de las ulceras marginales que ocurren como complicación de las resecciones gastricas.

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A concealed disk is one that protrudes so slightly that it can hardly be found at operation unless the subdural region is explored with great care. Concealed disks make up more than 25 per cent of the total cases. Symptomatically there is no difference in the manifestations, but at operation the detection of the lesion is more difficult. Furthermore, the most important reason for avoiding spinal contrast mediums is that a concealed disk does not show a filling defect.

Uebermuth stated that "gynecologic backache" may be the result of changes in the intervertebral disks.

MECHANOGENISIS OF DISK LESIONS

Intervertebral fibrocartilaginous disks protrude posteriorly into the spinal canal as the result of unusual stress or strain applied to the vertebral column. The stress may be the result of a single outstanding injury or the result of repeated injuries of varying degrees of severity.

There has been considerable controversy concerning the mechanism of injury. Some authors believe the disk is more apt to be protruded when the spine is in flexion, and others think it is more vulnerable in extension. The discussion hinges around the relaxation or tautness of the posterior spinal ligament. There is no doubt that when the spine is flexed, the nucleus pulposus is driven backward, but at the same time the posterior spinal ligament is stretched and made taut because the posterior space occupied by the intervertebral disk is increased.

Friberg believes that during life it should be assumed that the nucleus must degenerate before it ruptures, unless the intervertebral disk has been subjected to unusual violence. He believes further that extremely strong pressure, sufficient to enter the bony substance, is a prerequisite to protrusion of the annulus fibrosus. If the whole nucleus pulposus or a part thereof is loosened, the detached portion alone protrudes. He makes the statement that the intervertebral disk in the intervertebral space exposed by operation, was on the whole unchanged. That is, the space was not narrowed, despite the fact that operation had revealed perforation of the annulus fibrosus through to the nucleus pulposus, and that large portions of the latter had been removed.

Several years ago Schmorl connected some of the disturbances of the intervertebral disk with the insertion of the posterior longitudinal spinal ligament. This ligament adheres to the vertebral body by only a few thin fibers, while its main fibers adhere to the intervertebral disk. It spans like a bridge the slightly retracted posterior surfaces of the vertebrae. Owing to this, no abnormal traction can act on the ligament and no abnormal ossification can occur. Larger ossifications protruding into the front of the vertebral canal are seen in the lateral roentgenograms as posterior spurs. Schmorl's nodules (herniated disk tissue) originate in the intervertebral disks. In addition, ossifications of the ligamenta flava or marginal dents of the smaller vertebral joints may protrude from behind into the vertebral canal.

SIGNS AND SYMPTOMS

Not all disk prolapses produce symptoms of sciatica nor are all sciatic troubles due to disk protrusions. The most common symptoms and signs and those which are of the greatest value in arriving at a clinical diagnosis of protrusion of a lumbar disk are unilateral sciatic pain, which occurred in 78 per cent of Love's cases, and bilateral sciatic pain, present in 16 per cent. In the other 6 per cent, backache alone or extension of pain elsewhere than along the course of the sciatic nerve occurred. Pain which interfered with sleep at night was complained of by 24 per cent of the patients. This is an important symptom when present. It is particularly suggestive of a lesion of a nerve root, but it is much more common in cases of intraspinal neoplasm than in cases of protruded disk. Another indication of involvement of a nerve root or of a radicular type of pain is accentuation of the pain on coughing, sneezing or straining at stool. Such accentuation occurred in 64 per cent of Love's cases. Paresthesias in the dermatome supplied by the compressed nerve root are of value in the diagnosis and localization of the protrusion. Paresthesias occurred in 50 per cent of Love's cases. On the other hand, sphincteric disturbance occurred in only 4 the case of a patient who lifted a weight without suffering much distress, but later the same day experienced pain in his lower extremities followed by flaccid paraplegia. Examination revealed anesthesia up to the inguinal ligaments, absent knee and ankle jerks and incontinence of both sphincters. The patient died 16 days later. Opposite the intervertebral disk between the twelfth thoracic and the first lumbar vertebrae was found a mass of the pulp of the intervertebral disk which had been displaced into the vertebral canal. In the same year Goldthwait (1911) produced excellent theoretical arguments to prove that as a result of trauma, the substance of the intervertebral disk might cause compression of the cauda equina. He made this diagnosis in a patient with motor, sensory and sphincter paralysis. Exploration by Harvey Cushing revealed only a narrowing of the osseous canal at the lumbosacral junction. The history was so characteristic that it appears quite probable that a ruptured disk was overlooked (possibly a concealed disk).

Dandy in 1929 reported 2 cases in each of which loose cartilage from an intervertebral disk caused compression of the structures within the spinal canal. He thought that the entire posterior part of the intervertebral disk was separated and displaced rather than that the nucleus pulposus composed the greater part of the mass.

By intimate cooperation between neurosurgeons and orthopedic surgeons, a new chapter in the etiologic diagnosis of sciatic pain has been written. In 1934, Mixter and Barr demonstrated that root compression as a result of pathologic changes in the intervertebral disk was a common cause of severe sciatic pain. In addition, they called attention to the true nature of the "chondromas" and the role played by the nucleus pulposus in these lesions. Prior to this important contribution the diagnosis of ruptured intervertebral disk could be made only at operation. Moreover, the lesion usually was mistaken for a neoplasm. Spines were explored only when the symptoms and findings were those of spinal cord tumor. Mixter and Barr deserve the credit for calling attention to the presence of ruptured disks in many cases of severe back and sciatic pain with but meager neurologic findings. This new syndrome was discovered through the integration of the knowledge accumulated by several investigators. Dandy claims that intervertebral disk protrusion has become the most frequent lesion encountered by neurosurgeons.

Iodized oil is a permanent deposit in the subarachnoid space (unless removed subsequently) and passes freely into the fluid-containing spaces in the cranial chamber. It is a matter of serious concern, even though there is no absolute proof that it does actual harm. Its presence is a good pretext for medicolegal action, particularly if no disk is found at operation.

In 1937 Reichert first substituted air for iodized oil as a contrast medium and in 1939 reported 35 cases with excellent diagnostic results. Air shadows are by no means so striking as iodized oil shadows.

The next diagnostic advance was made by Semmes who reported 16 cases that were diagnosed solely by history and neurologic examinations without any contrast medium whatever.

PATHOLOGIC CHANGES IN DISKS

Intrinsic disk lesions include traumatic, degenerative and infectious conditions, which have been described by Ghormley. In a typical clinical case of ruptured intervertebral disk, a large part of the tumor is composed of nucleus pulposus. The presence of portions of the annulus fibrosus in this mass does not alter the fact that the presence of nucleus pulposus is the cardinal observation. Bradford and Spurling refer to this entity as "rupture of the annulus fibrosus with posterolateral or posterior herniation of the nucleus pulposus." Other terms used are "rupture of the intervertebral disk" and "herniation of the nucleus pulposus," protrusion and extrusion.

CONCEALED DISK SYNDROME

In one publication Dandy discussed a variation of the lesion which he called a "concealed disk." A concealed disk is one in which a forceps may drop into the substance of the disk through a small opening. (A forceps cannot sink into a normal disk.)

the spinal nerves near their only exits from the spinal canal, it is logical for the radicular neurologic findings to localize the lesion. The predominance of these lesions at the fourth lumbar and lumbosacral disks simplifies the problem of localization. If only those patients who are incapacitated by involvement of the components of the sciatic nerve are selected for operation, relief of symptoms can be promised uniformly. Recurrence of the pain and disability after the patient has resumed active labor is a real possibility.

No lesion can assume much size in the cervical or thoracic regions of the spinal canal without interrupting some nerve pathway and thus calling attention to a compressive lesion. In the lumbar region, however, a mass may be fairly large before any conduction system is affected. Friberg made the experimental observation that herniations up to 8 by 8 by 8 mm. may lie lateral to the dura and nerve root without producing a demonstrable filling defect in the myelogram.

LOCALIZATION OF INTERVERTEBRAL DISK DISTURBANCES

Protrusion of any intervertebral disk may occur but in the vast majority of cases the displacement occurs in the lumber region of the spinal canal. Approximately 96 per cent of Love and Walsh's 500 patients had lumbar protrusions. There is a very high incidence of protruding disks at the fourth and fifth lumbar interspaces; 96 per cent of all the lesions are found at the fourth and fifth lumbar disks and they are fairly evenly divided. Protrusions in the cervical and thoracic regions of the spinal canal, because of the limited space between the spinal cord and the bony canal, resemble more closely intraspinal neoplasms. Usually they are detected more promptly than those in the lumbar region, where the cauda equina has more freedom of movement.

In 1919 Dandy introduced air into the spinal canal. In 1922 Sicard and Forestier introduced lipiodol into the spinal canal. Chamberlain employed oxygen or air myelography. Spurling introduced Pantopaque, which is immediately removed by aspiration.

DIAGNOSIS

The most important diagnostic question is, "Are we dealing with a disk syndrome?" The second question is, "Where is the trouble located?"

The diagnosis of a ruptured disk and its location usually can be made solely by the history and examination, and by so doing one relieves the patient of discomfort and possible after-effects. Not even a lumbar puncture is always necessary.

Our present concept of this syndrome was established through the evolution and utilization of the knowledge accumulated by many neurologists, neurosurgeons and orthopedic surgeons.

If a person is awakened from sleep by pain in his back which is improved by change of position, it indicates a mechanogenic lesion, and the diagnostician has presumptive evidence of a space-occupying lesion in the spinal canal. The pinch test is performed by strongly pinching the skin and comparing the sensation with that following stroking with cotton. Some authorities run a hypodermic needle through the anesthetic skin. Others run a safety pin through the skin and clasp it in position. This impresses the patient very strongly. Occlusion of both jugular veins until the face is flushed and the head feels full aggravates the pain in the leg and the paresthesia (Naffziger). Lewin proposed the artificial fever test. Hyperpyrexia will not help a disk syndrome but will strikingly improve a comparable pain due to arthritis, fibrositis or muscle spasm.

Since over 96 per cent of all protruded lumbar vertebral disks are at the fourth and fifth lumbar spaces and since the unilateral approach is adequate to find the lesion whether it is at the fourth or fifth disk, it remains only to make the diagnosis of a protruded lumbar vertebral disk in order to disclose its location and remove it.

How can the diagnosis of a ruptured vertebral disk at the fourth and fifth lumbar interspaces be made with assurance? The diagnosis is made on low midline lumbar backache plus pain down the back of one or both legs, the pain is intensified by coughing and sneezing and the pain must be recurring and not continuous. There may or may not be diminution of the Achilles tendon reflex or sensory or motor loss in the distribution of per cent. When such disturbance occurs, it usually means that a very large lesion is present, producing a complete subarachnoid block, which commonly is not associated with protruded disk.

One characteristic of the course of the intervertebral disk syndrome is its variability, which is characterized by intermittence of symptoms.

I had one patient who found that by punching his right buttock he was able to reproduce his pain on the right side, whereas punching his left buttock caused no pain. He had a right-sided protrusion of the fourth lumbar disk. This is the reverse of the Queckenstedt test. It is a test that is worthy of performance but should not be given too much prominence. If it is positive it is confirmatory evidence.

I have been able to localize many lesions by giving the patient a pinch of snuff to cause a sneeze or two which exaggerates his pain.

In an analysis of 500 consecutive cases in which operation was performed for protrusion of one or more intervertebral disks, Love and Walsh found that 58 per cent of the patients gave a history of a specific injury to the back. Analysis of their series of cases reemphasizes the point to which Love and Walsh have called attention previously, that a high percentage of patients give a history of intermittency of symptoms. Eighty-four per cent of their 500 patients had intermittent symptoms. Whether this intermittency is due to vascular changes in the protruded portion of the disk, as suggested by Deucher and Love, or to degeneration and interruption of pain fibers as a result of compression of the nerve 62 per cent had a history of trauma; 80 per cent, however, had pain on coughing and sneezing, and 65 per cent had various kinds of numbness and tingling in the outer border of the leg and foot. The most common finding was a positive Lasègue sign, which occurred in 82 per cent and was associated with a tender spine in 82 per cent of the cases. There was some interference with the ankle jerk on the affected side in 77 per cent, changes in sensation in the foot and leg were observed in 70 per cent and roentgenologic changes were observed in about 25 per cent. Changes in the spinal fluid were noted in 50 cases, of which 45 had a total protein of over 40 mg. From the study of the spinal fluid alone, one was able to say that a good result could be anticipated if there were raised total protein. Contrast media were used in the beginning (lipiodol), but later air was substituted. Now air is used exclusively, but only in atypical cases to confirm the diagnosis.

From the large number of patients with varying degrees of back and sciatic pain, a small proportion have both back pain and pain throughout the sciatic distribution. The pain is intractable to conservative measures and there have often been previous attacks. There are definite but often inconspicuous neurologic findings.

Mild cases of herniated nucleus pulposus are more prone to remissions and therefore may not call for surgical treatment. The surgical treatment of herniated nucleus pulposus is fundamentally a procedure to relieve pain.

In spite of the fact that many patients with severe persistent sciatic and back pain recover spontaneously without the aid of surgery, there is a large group who improve but do not fully recover. In 1906 Camus and Sezary reported a case which from the history and findings was in all probability due to herniation of the nucleus pulposus. Seeing the same person in 1911 Dejerine said, "Son etat est toujours le meme." Many patients who have suffered, year after year, from intractable sciatic pain without showing evidence of a progressive lesion probably have had ruptured intervertebral disks with herniation of one or more nuclei pulposi.

Since the herniated nuclei pulposi compress rangements of the knee joint where locking, limp, pain and limited movement disappear but the knee remains vulnerable to moderate stresses and strains, precludes athletics and combatant military service.

Previous objections to the treatment of these cases were: the use of lipiodol which was irritating and was objectionable to industrial commissions; and laminectomy, which might weaken the back. Now that these two objections have been overcome, the back is not weakened, and the patient's stay in the hospital is strikingly reduced.

Many writers advise spinal fusion following removal of a ruptured disk, some almost routinely, others largely in industrial cases, in which heavy work must be resumed. Where compensation is a factor, a fusion will not diminish the complaints and in cases with hard labor ahead, a rest of three months is probably adequate protection.

At the Mayo Clinic the neurosurgical staff has operated for protruded intervertebral disks in more than 1600 cases. By means of detailed studies of these cases, the neurologists, orthopedists, roentgenologists and neurosurgeons have come to recognize a protruded disk syndrome, and the accuracy of diagnosis, which is founded on the history and clinical and roentgenologic findings, is extremely high. The therapy, likewise, gives excellent results with a mortality rate in surgical cases of less than 0.25 per cent.

TREATMENT OF THE DISK SYNDROME

The treatment of the disk syndrome includes the nonoperative, operative and postoperative measures.

Conservative Treatment. Love and Walsh urge a trial period of conservative treatment, unless there is gross evidence of damage to the central nervous system before undertaking surgery for the relief of pain in the neck, shoulders, back, or lower extremities. A period of observation and conservative treatment usually will indicate whether there is an underlying lesion of the spinal cord or of a nerve root which must be relieved surgically.

Operative Treatment. Three important advances have improved and greatly simplified the operative treatment. Originally a bilateral laminectomy was performed and the disk was removed intradurally. Mixter and Barr removed the disks extradurally by the bilateral approach. Semmes and also Love in 1939 reported their removal by hemilaminectomy and by removing only a notch of bone from a lamina. Love in 1940 removed a high percentage of ruptured disks through the interlaminal space without removing any bone. His technic is the acme of perfection, but can be accomplished only when the space between the laminae is of sufficient size. Love introduced his precision operative technic of exposing and removing many disks without sacrificing any bone.

Precision Aids in Localization. There are precision tests in localizing troublesome intervertebral disks and determining the specific vertebrae involved. These should be reviewed in every case the day before operation. In addition, on the day before operation 1 cc. of methylene blue should be injected into the skin at the level of fourth lumbar intervertebral disk and expose a lateral roentgen film. The films should be in the illuminated box in the operating room during the operation. This marker is of great aid in localization during the operation.

Anesthesia. Many surgeons prefer local anesthesia for the preliminary stages of the operation. When the affected spinal nerve is located and the offending disk is discovered, a change is made to a general anesthetic; usually a gas anesthetic, only for the highly technical part of the operation.

The control of hemorrhage is accomplished by: adrenalin in the local anesthetic; sponges of various sizes and shapes; electrical coagulation; silver clips and small pieces of muscle (like postage stamps) under pressure sponges. Mechanical aspirators are indispensable in maintaining an unobstructed dry field. Lewin uses the two aspirator-retractor method to visualize the affected spinal nerve and the offending disk.

Disk Operations There have been significant refinements in technic which permit more rapid operating with less hemorrhage, less shock and greater success. Efficient retraction is indispensable. Adequate deep illumination is imperative. Love's dura retractor and nerve retractor are very helpful. Spurling performs his operation under the fourth or fifth lumbar or first sacral nerves.

An overwhelming percentage of protruded vertebral disks can be diagnosed and localized by the history and examination alone, and all accessory diagnostic tests can and should be avoided wherever possible.

In cases of protrusion of a disk at the third lumbar level, the pain will be localized to the front of the thigh instead of the back of the leg.

The three neurologic signs which are most helpful in the diagnosis of protrusion of a lumbar disk are: Lasègue's sign, sciatic nerve tenderness, and diminution or absence of the Achilles tendon reflex on the side of the pain.

Mixter and Barr deserve the credit for calling attention to the presence of ruptured disks in so many cases of severe back and sciatic pain with but meager neurologic findings. The diagnosis may be suspicious, presumptive, probable or positive. The percentage of error in diagnosis of the presence of a protruded intervertebral disk and its location should be very small, in experienced hands. Usually it is more harmful to withhold than to perform an operation.

Dandy claimed that the diagnosis of a ruptured disk could be made solely from the patient's story of low backache plus sciatica, occurring in attacks, usually after a relatively trivial injury such as a lift, bend or strain. Since the diagnosis can be made with accuracy by the clinical symptoms alone, lumbar punctures, injection of contrast mediums into the spine are unnecessary.

symptoms are sufficiently different (usually pain in the front of the leg or diminution of the patellar reflex) to suspect a lesion at a level higher than the usual one.

With the characteristic pain in the lower lumbar region and down the hip and back of one or both legs, the affected disk therefore is nearly always at the fourth or fifth lumbar, and it has been necessary to explore only one or both of these disks. Frequently there is a clue, such as a reduced or absent Achilles tendon reflex, which points to the fifth, although it may also exist with one at the fourth.

If the diagnosis is questionable, an exploration of the region is preferable to spinal injections of air or iodized oil.

PROGNOSIS

The prognosis of disk injuries under conservative management is always uncertain because of the probability of recurrent attacks of backache, accompanied by sciatic radiation pain. The outlook following an accurate diagnosis in uncomplicated cases, and an early appropriate operation, is excellent. The results depend to a consdierable degree on the question of compensation and litigation.

Many cases of sciatica present a characteristic syndrome which can be relieved by surgery. The disk syndrome accounts for an overwhelming percentage of the "heretofore incurable and untreatable" low back pains and sciaticas, sacroiliac strains and arthritis of the spine.

Treatment should not be started until after a complete history has been taken, and physical, neurologic and roentgenologic examinations have been performed. Even when the tentative diagnosis of posterolateral herniation of the nucleus pulposus has been made, nonsurgical treatment should be tried.

I have seen practically all gross symptoms completely disappear under conservative treatment. Also I have seen the Achilles and patellar reflexes return during the course of conservative treatment. But every one of these patients had definite "hangover" symptoms and would have been better off if he had been treated surgically.

The situation is remarkably analogous to that which obtains in cases of internal derangements of the knee joint where locking, limp, pain and limited movement disappear but the knee remains vulnerable to moderate stresses and strains, precludes athletics and combatant military service.

Previous objections to the treatment of these cases were: the use of lipiodol which was irritating and was objectionable to industrial commissions; and laminectomy, which might weaken the back. Now that these two objections have been overcome, the back is not weakened, and the patient's stay in the hospital is strikingly reduced.

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Disk Operations. There have been significant refinements in technic which permit more rapid operating with less hemorrhage, less shock and greater success. Efficient retraction is indispensable. Adequate deep illumination is imperative. Love's dura retractor and nerve retractor are very helpful. Spurling performs his operation under local anesthesia. He does not do a complete laminectomy.

An intravenous infusion of dextrose in normal saline should be started as soon as the incision is made. Compatible blood should be at hand for immediate instillation if circumstances demand.

Just before operation make a short cross incision through the skin at the level of the interspace to be explored. If a long incision is to be made, several superficial scratch cuts can be made, to be matched up when the incision is finally sutured.

Suture towels to skin edges.

Love's Operative Technic. The anesthetic of choice is ether, which is best administered by the open drop method over the end of a Magill intratracheal tube, introduced after the patient has been anesthetized by nitrous oxide and oxygen. The patient is then placed on the operating table as for any laminectomy. (Love performs his cervical laminectomies with the patient in the upright position; but operations on other regions are performed with the patient prone, the torso being supported by two rolled pillows so that there is no interference with breathing.) When the lesion is low in the lumbar region or at the lumbosacral space, a large soft, flat pillow is placed across the lower ends of the rolled pillows and between the symphysis pubis and the xiphoid process, in order to increase the prominence of the lumbar spinous processes. This facilitates exposure in the lumbar region where the muscles are large and the distance from the skin to the anterior surface of the dura mater, or disk, is greater than at any other level of the spine.

Subperiosteal exposure of the spinous processes and laminae of the two vertebrae between which the protrusion has occurred. furnishes adequate exposure for removal of the disk. (Lewin has designed a special instrument for spreading apart the laminae. to facilitate removal of protruded intervertebral disks in those cases where the operation can be performed without removing any bone.) Occasionally the laminectomy necessarily is more extensive, but often only a portion of the lamina of one of the vertebrae needs to be removed. If the protrusion is lateral it may be necessary to remove the articulating facets on that side in order to secure adequate decompression of the involved nerve root. Whenever possible, laminectomy should be narrow and the facets should be preserved. This maintains normal stability of the spinal column following operation. In the cervical and thoracic regions, wide laminectomy, at least on one side, is the rule, for here the spinal cord must be rotated in order to obtain satisfactory exposure. Section of one or more teeth of the dentate ligament facilitates rotation of the cord.

Unilateral protrusions in the cervical region can be removed by hemilaminectomy. This is always preferable when one is dealing with intraspinal lesions in the cervical region, because the neck is left in a more nearly normal condition after operation. In spite of the free motion of the cervical spine, there is little or no danger of dislocation—a condition which does occur, although rarely, following bilateral cervical laminectomy.

The protruded disk may be removed extradurally or transdurally. The operation should be adapted to the particular case, after exposure has been made. If the protrusion has occurred to one side, Love prefers extradural removal. If the protrusion is in the midline, and particularly if the extruded mass is small, transdural removal is easier and is accompanied by less bleeding. If the dura is retracted for an anterior extradural approach to a small herniation of the disk, bleeding from the extradural vessels is likely to be profuse and very troublesome. Love finds that the extradural veins are either thrombosed or sufficiently displaced by the larger protrusions, so that they are not injured during the removal of the mass, and consequently the hemorrhage is less. Some of the protrusions are of bony hardness while others are soft and fluctuant. Fluctuant masses should be aspirated with a small needle to exclude the possibility of pus in a tuberculous lesion before the mass is incised. for to incise such a lesion in the presence of an open dura mater is fatal.

From the point of view of surgical anatomy, protrusions are of two kinds: (1) those that pop out when the dura mater is retracted and the thinned out posterior longitudinal ligament is incised. and (2) those that are firmly adherent to the adjacent vertebrae and require sharp dissection for their removal.

At operation the protruded disk usually resembles a bald head or the little ball that is spun on a roulette wheel. The extruded portion of a protruded disk may look like a round yellow pea. The nerve is sandwiched between two firm objects. The mechanics of the relation of a protruded intervertebral disk and the spinal nerve indicates that the squeeze is being carried out by the protruded disk compressing the nerve against the dura, the ligamentum flavum or bone.

Some authorities advise vigorous curettage of the disk. Others recommend scraping vertebral spurs and posterior vertebral margins. I look upon the latter procedure as potentially harmful because it is analogous to removal of spurs from the os calcis which stimulates local osteogenesis.

Love keeps his patients in bed for from 12 to 14 days following operation, during which time they rest on soft pillows so arranged as to keep the spine straight. They are turned every four hours. The skin sutures, either silk or dermal, are removed on the tenth postoperative day. Catheterization is performed every eight hours if the patient is unable to void. If voluntary urination does not occur by the third day, an indwelling urethral catheter is inserted for continuous drainage of the bladder until the patient is out of bed. The indwelling catheter and the bladder are irrigated twice daily with a 4 per cent solution of boric acid, and 7½ gr. (0.48 Gm.) of methanamine and 15 gr. (1 Gm.) of ammonium chloride are given by mouth three times daily. Love believes this routine minimizes the danger of cystitis and infections of the urinary tract. The catheter is removed after five days and is replaced by another sterile catheter.

A common occurrence during operation is the sudden jumping of a thigh or leg when a lumbar spinal nerve is compressed during the operation. It is a very valuable danger signal.

After the Operation. There are several "stunts" used by various surgeons in the postoperative care of these patients. These include the split mattress, the Herzmark frame, and the Stryker frame. Others use no special apparatus but place the patient on his side on an ordinary mattress. The nursing care of the uncomplicated case is very simple, amounting to routine nursing care of all back patients.

THE QUESTION OF COMBINED OPERATION: REMOVAL OF DISK AND FUSION

When should fusion be used as a supplement to the removal of a protruded or concealed intervertebral disk? The neurologist leans far away from fusion. The orthopedic surgeon, in general, leans closely toward fusion. There are a few, however, who take a middle ground, these being the men who work in teams of neurosurgeons and orthopedic surgeons. Past experience with cases of chronic backache compels the orthopedic surgeon to be very cautious in advising against fusion. So many of these back cases are chronic and removal of a disk no matter how perfectly, leaves the person with a chronic, weak, inefficient, insufficient spine. It is unreasonable to expect the removal of the protruded disk alone to correct the back trouble.

The question of whether the fusion operation should be performed at the same time as the removal of the disk is important. I believe that most of the fusion operations should be done at a subsequent time rather than at the time the protruded disk operation is performed. If there are congenital anomalies and a long history of chronic back trouble, and the person is to return to heavy duty, a spine fusion should supplement the exploratory operation. The cases in which Macey employs the combined procedure of hemilaminectomy, removal of the disk and bone grafting, include such conditions as spondylolisthesis, separated neural arch without slipping of the vertebral body and marked narrowing of the intervertebral space with hypertrophic arthritic changes. At this point let me emphasize the importance of the intervertebral foramen and the articular facets which if destroyed or weakened will lay the groundwork for future mechanical trouble of serious degree.

The static type of back trouble and the chronic type of back trouble require a fusion operation. The history of the case, the physical examination, the roentgen-ray findings and the occupation, determine whether a fusion should be performed. Each surgeon must decide for himself whether the combined operation should be done at one time or in two separate stages. If it is to be done in two stages the patient should be told before the first operation that a second one should be performed later.

The number of combined operations performed has increased during the years. In the year 1936 no combined operations were performed at the Mayo Clinic in cases of suspected protrusion of an intervertebral disk. In 1937, 1 per cent of the patients for whom laminectomy was performed also underwent a bone graft operation. In 1938, 6.5 per cent, in 1939, 14.8 per cent and in 1940, 14 per cent of the cases in which laminectomy was performed for suspected protrusion of an intervertebral disk, had bone grafting. The increase in this percentage is due not only to the fact that both neurosurgeon and orthopedic surgeon felt that some patients with protruded disk should undergo bone grafting, but also to the fact that in many cases in which the orthopedic surgeon had planned a bone grafting operation he asked that the neurosurgeon perform laminectomy so that it could be determined whether or not a protruded disk might be present. In the latter group they particularly refer to cases of spondylolisthesis, spondylolysis and the like.

It was their opinion that the surgeon could promise relief to the majority of patients with protruded intervertebral disks by removal of the protrusion alone. But it was also their opinion that there was a group of cases in which bone graft or fusion operation should be done to relieve most of the symptoms and is to be performed it should be done by two teams, if they are available: first, a neurosurgical team, and second, the orthopedic surgical team.

When a fusion is performed, the placement of the grafts is of great importance. It is imperative that the grafts be in contact with bone. Bilateral grafts, i.e., one on each side, using heavy grafts, is advisable. If the grafts are not in contact with bone, hemorrhage will float them apart and failure of consolidation is almost inevitable. It is important that a dry field be maintained because hemorrhage will jeopardize the fusion. There must be no slipping of any of the bone grafts because slipping will cause pressure on the dura and nerve pain. If the dura is opened and cerebrospinal fluid leaks out, it will "float" the grafts and jeopardize bone contact and subsequent fusion.

COMMENTARY ON THE DISK SYNDROME SITUATION

The characteristic symptoms and signs that we were taught as indicating the presence of a spinal cord tumor are being taken over bodily in diagnosing a disk syndrome (except for the intermittency of symptoms in disk lesions).

Some orthopedic surgeons say, "Wait till you see how many disk removal cases will need subsequent fusions."

Neurosurgeons say, "If you only knew the number of fused spines that should have had disk removals first."

How many disk-operated persons return for fusion?

How many fusion-operated persons return for disk operation?

How many disk-operated persons return for fasciotomy?

The diagnosis of a disk syndrome is likely to become an escape for inadequate diagnosis.

Compensation is a self-perpetuating mechanism producing invalidism. It is the perpetuation of symptoms for unconscious purposes.

A protracted disability enhances the original organic symptoms as a hysterical aftermath, used for escapist or other purposes.

Dandy claims that merely opening the traumatized disk effects the relief or cure.

SUMARIO

Los sindromos clásicos e indicativos de tumores de la medula espinal se usan hoy en dia en el diagnostico de las fracturas del disco intervertebral (con excepción de su intermitencia en estas ultimas lesiones).

Según el cirujano ortopédico la resección del disco intervertebral requiere tarde o temprano la fusión vertebral. Entanto el neurocirujano clama la necesidad de laresección del disco ántes de que se practique la fusión espinal.

Hoy an dia el problema depende de lo siguiente: Cuantos casos de resección del nucleo pulposo requeriran con el tiempo la fusión espinal? Cuantos casos de fusión requeriran la resección del disco? Cuantos casos de resección del disco necesitaran la fasciotomia?

El diagnostico del nucleo pulposo es en muchos casos una mascara para cubrir errores de diagnostico en esta clase de casos.

Segun Dandy el mero hecho de abrir el disco traumatizado produce alivio o curación. Nachlas correctamente pregunta: Cual procedimiento de la operación produce el alivio? y luego anade durante la operación producimos bajo la anestesia una flexion moderada de la columna espinal. Las raices nerviosas son estiradas durante la retracción que es necesaria en la operación. También se llevan a cabo otros procedimientos tal como manipulación sacro-iliaca, esteramiento del nervio ciatico mayor, fasciotomias y miotomias.

Los dermatomas son de valor en la localización de lesiones intraspinales.

Endometriosis as Cause of Small Bowel Obstruction

A Report of Three Cases

EDWIN L. ZANDER, M.D., VINCENTE D'INGIANNI, M.D., AND
EVERETT L. DREWES, M.D.
NEW ORLEANS, LOUISIANA

ENDOMETRIOSIS is one of the causes of intestinal obstruction of the small bowel which text books fail to list. Indeed, only 11 cases have been reported in the English literature. Zander and D'Ingianni each had the opportunity of exploring independently a patient with intestinal obstruction due to endometriosis of the small bowel. These two cases will be presented along with the only recorded case in the files at Charity Hospital in New Orleans. A survey of the English literature on this subject will be employed as a background.

Cullen first reported adenomyomas of the uterus in 1895. It was not until 1921, however, that a most complete study of the origin, symptoms and treatment of endometriosis was given by Sampson. Since Sampson's work the causes of endometriosis have been debated from time to time, and the present study can add little to these speculations. Rather is it our purpose to confine ourselves to summarizing the findings in the cases herein presented in some attempt to clarify the preoperative diagnosis, if possible.

CASE REPORTS

Case 1.—C.F., 32, complained chiefly of low abdominal pains, radiating into the back, accompanied by nausea, vomiting and hoarseness. She had been constipated for three days. Three months ago she noted a mass in the abdomen.

Menses started at 12 years, and had been irregular for the last few years with flooding and clots. She complained of dysmenorrhea and dyspareunia. There was no history of pregnancy.

A mass, about 10 cm. in diameter, was palpated in the lower abdomen, with rigidity and tenderness in the right adnexia. The diagnosis was fibroids and bilateral salpingitis. On Nov. 22, 1941, the patient was given infusions and blood transfusions. By a midline incision under spinal anesthesia a large fibroid was removed. A total hysterectomy was done along with an appendectomy. In doing so, a loop of the ileum was seen to be kinked. These bands were liberated.

On Dec. 25 the patient began to have nausea, vomiting and constipation. The thyroid was enlarged. There was tenderness below the umbilicus with distention. Diagnosis of partial intestinal obstruction was made. A roentgenogram of the abdomen showed no fluid levels; infusion and gastric suction relieved the patient.

On Jan. 5 she began having sharp abdominal pains with nausea and vomiting, epigastric distress and a growing mobile mass, the size of a hen's egg, in the lower right quadrant. She noted loss of appetite and weight. There was a history of jaundice and black stool with blood at times. The blood pressure reading was 128/64. Icterus index was 30; white blood count, 13,800. The roentgenogram showed no evidence of fluid level, nor of gallbladder calculi. A barium enema was negative. There was a tenderness over the scar. The patient had hyperstaltic motion with two small bowel movements.

On Jan. 26 the Miller-Abbott tube was seen in the cecum. The next day a right rectus incision was made under spinal anesthesia. A nodule 1 × 2 cm. was found on the mesenteric border of the ileum 50 cm. from the ileocecal valve. It was thought to be intraluminal. Ten centimeters of the ileum bearing the lesion were resected and continuity reestablished by end-to-end anastomosis. The pathologist's report was endometriosis of the ileum. Postoperative course was uneventful.

Case 2.—A.F.D., 38, complained of pain in the lower right quadrant for a year and a half. She was troubled by dysmenorrhea, pains in the midline and backache. Menstrual pain occurred one to two days before periods, which were regular until four months previously; since that time her periods occurred from 16 to 26 days apart.

The patient gave a past history of colitis and gastric enteritis in 1935 and 1936. In May, 1938, she had a diagnostic curettage and cauterization of the cervix. In July, 1938, she was operated upon for a fistula. In 1940 she had another diagnostic curettage, cauterization and perineal repair. In 1943 she had a general examination including roentgenograms, but no abnormal findings resulted. In 1944, after an attack of severe cramps, a diagnosis of gastric enteritis and colitis was again made. In 1944 roentgenograms were negative for gastro-intestinal pathology. On Nov. 6, 1945 she was admitted to the hospital with diagnosis of gastric enteritis. She was discharged on Nov. 9. Laboratory findings on the whole were negative. The blood count showed slight leukocytosis with no change in the red count. This condition subsided before the patient was discharged. Sedimentation rate and stool were normal. There were no roentgenologic findings.

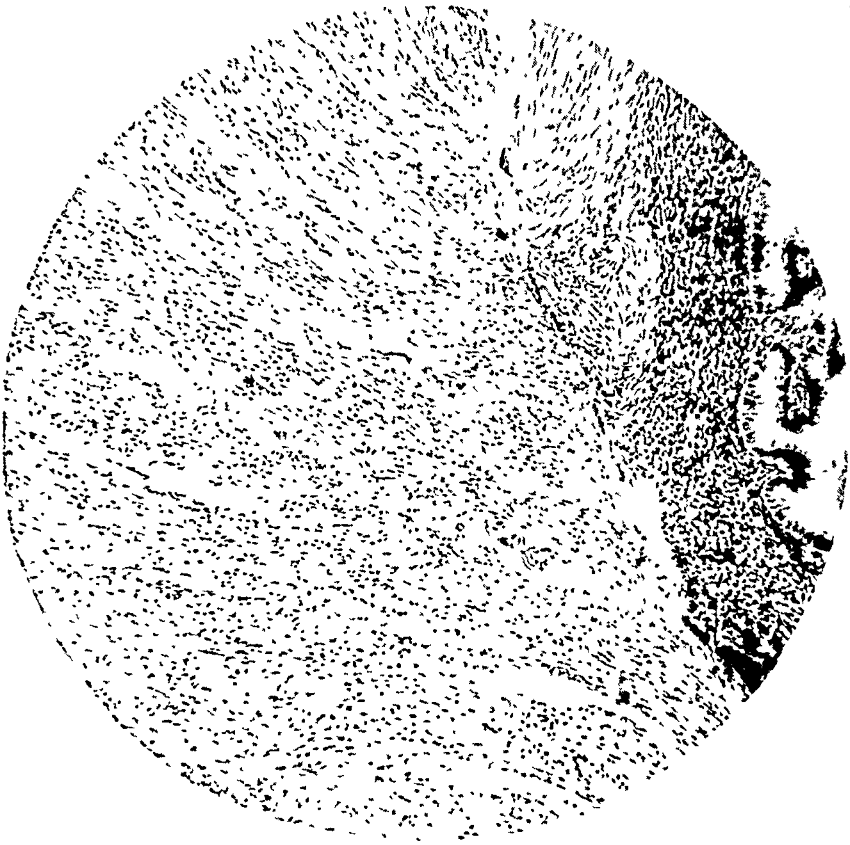

Fig. 1. Photomicrograph of specimen from Case 1.

As for her marital history, there had been one pregnancy with a forceps delivery in 1939, which left a bad laceration.

On Dec. 4 bimanual examination revealed a cervical polyp, retrodisplaced uterus with second degree prolapse and a cyst of the left ovary. On Dec. 5 exploration revealed a chocolate cyst of the left ovary, prolapse of the right ovary, retrodisplaced uterus, chronic endometriosis, nabothian cyst of the cervix and subacute appendicitis. Resection of the left ovary was done with suspension of the right ovary and suspension of the uterus (Gilliam). A diagnostic curettage with [illegible] of the cervix as well as an appendectomy was done and the postoperative condition [illegible]

On Jan. 27 she was readmitted to the hospital complaining of abdominal pain. Two weeks previously, after eating pork, she began having abdominal pain and diarrhea. She noted a mass in the lower right quadrant which moved toward the left. Pain and vomiting persisted. Physical examination revealed normal temperature and increased pulse and respiratory rate. Peristalsis could be seen on the abdominal wall with a mass in the lower right quadrant. Tympanitis and borborygmus were present. A roentgenogram showed intestinal obstruction. Exploration on Jan. 29 revealed a mass involving the terminal ileum and the omentum. The involved area was resected and an end-to-side ileo-ascending colostomy was done. A partial intestinal obstruction was found with stenosis of the ileum, due to what was tentatively described as tubercular ulcers of the ileum. The pathologist's report was endometriosis of the ileum with acute and chronic inflammation with congestion and edema. Postoperative convalescence was uneventful.

Case 3.—E.G. complained of pain in the lower right quadrant for the previous eight months.

The pain became worse with each menstruation. Her periods had been markedly irregular, lasting from a few hours to 15 days. She was sterile, giving no history of pregnancy. She complained of pain in the lower abdomen on intercourse, and said that frigidity had developed after an operation. The patient noticed a growing mass in the lower right quadrant during the past few months. Occasionally she had attacks of pain with nausea and vomiting, until she was unable to retain food or fluids. One and a half years ago she was admitted to the hospital. Along with a diagnostic curettage, the left ovary and tube were removed, and the right tube and part of the right ovary were resected. Diagnosis of salpingo-oophoritis was made. For a short time the patient was well and regained weight.

On Jan. 6, 1946, she was admitted to the hospital with diagnosis of a large ovarian cyst. Exploration revealed a mass 14 cm. in diameter in the lower right quadrant (20 cm. from the ileocecal valve), which involved the cecum, several loops of the terminal ileum and the omentum. The entire mass was bound down posteriorly and into the pelvis as well as on the anterior abdominal wall. The surgeon felt that the mass was either a remnant of an inflammatory reaction or possibly a malignancy; therefore, it seemed better to do a circuiting procedure, and, if necessary, at a later date a resection. The uterus was found in good position. The right ovary was approximately 6 cm. long and showed multiple cystic degeneration. Material was taken for biopsy, and the first free loop proximal to the mass was anastomosed with the proximal portion of the transverse colon. Her condition was good. The pathologist reported chronic inflammatory reaction of the tissue. For three days she was in excellent condition.

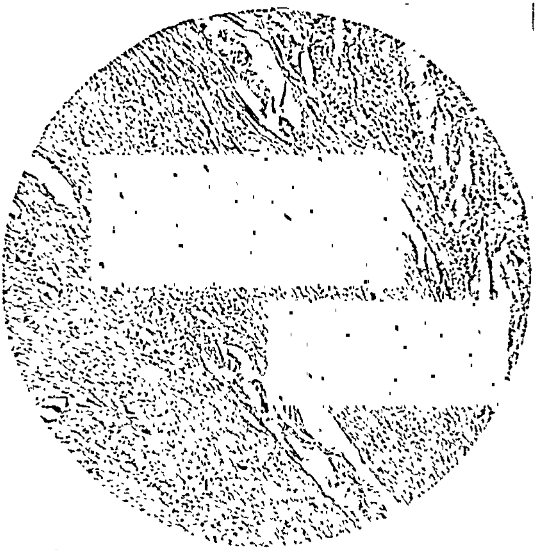
Fig. 2. Photomicrograph from specimen in Case 3.

Suddenly, on Jan. 10, she became dyspneic, cyanotic, with the facies of impending death. Within an hour after onset of these findings she died of massive pulmonary emboli. Autopsy examination revealed the ileum and cecum and omentum matted together. There was no leakage from the site of the anastomosis; there was a kinking of the ileum about 20 cm. from the ileocecal valve with many adhesions about the ileum, and at this area there was evidence of endometriosis with chronic inflammatory reaction in the cecum and the ileum.

DISCUSSION

According to Masson endometriosis is found in women between 25 and 45 years. The ages for those having involvement of the ileum ranges from 19 to 50. However, Schofield and Bacon reported a case as early as 11 and another at 72 years of age. In only nine cases found in the English literature could age be established; six of these were in the third decade.

Little information could be obtained from the literature concerning race incidence, except the repeated statement that endometriosis is considered relatively rare in Negroes. Curiously enough, one of our cases, the Charity Hospital case, is that of a Negress.

Surveying the literature brought to light the fact that endometriosis of the small bowel is not nearly so common as that of the large bowel; only 11 cases involving the small bowel were reported as compared with 40 cases by the same authors involving the large bowel (and 5 involving the appendix); this gives a ratio of 1:4. However, in pelvic operations where endometriosis of the ovary, cul-de-sac, or any other organ is found, it is worth spending time examining the small gut, for among the 11 cases reported, 8 had had a previous operation.

The symptoms complained of by patients with endometriosis vary with the organ or group of organs involved; therefore there was no set pattern of complaints. However, we shall try to group the symptoms complained of most constantly.

Dysmenorrhea of the acquired type was a prominent symptom. The dysmenorrhea grew progressively worse. In the survey seven patients stated that it was accompanied by nausea and vomiting, which likewise became aggravated. Five patients had intermenstrual pain which became worse during menses. Scanty periods occurred in four cases and was complained of over a period of years. Sterility was present in all cases and is a prominent finding in patients with endometriosis. Whereas Smith reports sterility in only 20 per cent of his cases, Shier finds it in 84.2 per cent of his group.

Dyspareunia was found in two cases reported upon, but this complaint is more common in cases of endometriosis of the sigmoid and of the rectum. Diarrhea likewise is a common complaint in endometriosis of the sigmoid, yet it was complained of in one of our three cases, in endometriosis of the ileum. In this particular case the patient had been treated for many years for colitis, which cleared up on removal of the involved tissues.

Reports that some pelvic pathologic process is always present in endometriosis, usually displacement of the uterus, is confirmed in this study. In every case the process was considered of sufficient prominence to warrant intervention. One patient had a large uterine fibroid, another marked retrocession, another had marked anteflexion with large adnexal masses.

The site of involvement of the ileum is interesting to follow in the cases reported; undeniably, it is close to the ileocecal area: 50 cm. away in one case, 6 cm. away in another case and 20 cm. away in the third case. Gale reported a case 60 cm. from the cecum; Glenn reported one 15 cm. proximal to the cecum.

Another finding that was constant in the cases of intestinal obstruction of the small bowel due to endometriosis was the presence of a loop of ileum that was puckered or kinked, bound down by adhesions that were fibrous in type.

One of the reasons for the difficulty of diagnosing endometriosis as cause of intestinal obstruction of the small intestine is that it resembles several other conditions, notably carcinoma of the bowel, diverticulitis and acute inflammatory disease. Several attempts have been made at differential diagnosis, but little success has been attained. For example, a point much stressed in differentiating endometriosis from carcinoma is that endometriosis does not involve the mucosa. However, in one of the cases presented here there was definite evidence of ulceration of the mucosa, and the mass seemed to be intraluminal. The gut became involved by an annular type of growth. Many cases of carcinoma, so-called "cured" by deep x-ray therapy were evidently not carcinoma at all, but endometriosis.

As regards treatment, simple bilateral oophorectomy has been suggested by Hutchins of Boston and agreed upon by many surgeons.

Andrews adds that the opportune time for operation is midway in the interval between menses. It is the opinion of the authors, however, that each case must be considered by itself, for the approach depends largely on the age of the patient and the extent of involvement. It seems wise to treat conservatively at first, for the obstruction is usually only partial, as is proved by roentgenograms and the fact that the Miller-Abbott tube can pass the point of obstruction. Once the acute stage is over, operation can be performed at the opportune time between menses, on a patient better able in many ways to withstand surgery.

It is a debatable point whether simple bilateral oophorectomy will relieve intestinal obstruction because of the presence of a tremendous quantity of fibrous tissue, which may eventually lead to a cicatriced obstruction. This point cannot be answered adequately, because none of the authors reported having tried this procedure. It is highly probable, however, that many cases of endometriosis of the ileum have gone undiagnosed, and the condition may have improved as a result of bilateral oophorectomy or the use of radium.

Having been confined to facts and findings up to this point, a few postulations and assumptions, which are a weakness with many of us, may not be considered irrelevant here. What are the predisposing causes of endometriosis? Other authors list uterine myomas, chronic salpingitis, retroflexions, previous inflammation, etc. Let us add the possibility of the following: Frequent and unskilful cauterizations of the cervix, improper conization of the cervix, insufflation of the tubes, injection of lipoid material and poor operative obstetrics. A particularly good example is the patient in Case 2, who gave a repeated history of cauterizations and conizations and a bad laceration following forceps delivery, as well as the continued inability of roentgenograms to reveal abnormal conditions.

As regards a preoperative diagnosis: whenever we find a patient with partial or complete intestinal obstruction, who has a history of sterility, dysmenorrhea, dyspareunia and previous pelvic diseases, where endometriosis was found, it is indicated that the obstruction is due to endometriosis of the small intestine.

SUMMARY

The authors report three cases of endometriosis as cause of partial and complete small bowel obstruction, with a survey of the English literature as background.

In an attempt to clarify the preoperative diagnosis, the age incidence, signs and symptoms, site of involvement and laboratory findings are aggregated. General suggestions regarding treatment are outlined.

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Present Concepts in the Management of Both Chronic and Acute Appendicitis: With a Report on 12,813 Consecutive Appendectomies*†

DONALD C. COLLINS, M.D., F.A.C.S., F.I.C.S.
HOLLYWOOD, CALIFORNIA

FROM available data, the appendix vermiformis was first discovered in the year 1524 by Berengario da Carpi, Professor of Surgery at Pavia, who left the first preserved written account of it. Andreas Vesalius,[1] in 1543, was the first to describe accurately and illustrate the normal appendix and its relationships to other abdominal structures in "De Fabrica Humani Corporis." In 1886, Reginald Fitz,[2] Professor of Pathology at Harvard Medical School, published his epoch-making article on the successful drainage of 100 cases of appendiceal abscesses as collected from the literature of the United States, covering the period 1848 to 1886. From his study he showed for the first time, in a clear decisive manner, that until proved otherwise all inflammatory processes in the right lower quadrant of the abdomen should be considered as originating in the vermiform appendix. Fitz was the first to coin the term "appendicitis." After this important contribution, the present treatment of appendicitis rapidly crystallized.[3] We find the leaders of American surgery in each generation seriously concerned with what would constitute better treatment of this common but deadly acute surgical disease. McBurney,[4] McArthur,[5] Senn,[6] Morris,[7] Oschner,[8] Murphy,[9] Moynihan,[10] the Mayos,[11, 12] Crile,[13] Deaver,[14] Monte Reid,[15, 16] and others left valuable contributions toward the better management of this disease.

Owing to the rapid expansion of other fields in abdominal surgery, the vermiform appendix has received less attention than formerly, but it nevertheless continues to play the killer role.[17] Hoerr[18] discovered with [illegible] that the mortality rate from acute appendicitis at the Peter Bent Brigham Hospital between the years of 1913 to 1940 had shown no improvement. We had forgotten the classical dictum of John B. Murphy:[9] "The earlier the operation, the lower the mortality." Any disease, which as part of its complications causes approximately 20,000 deaths from peritonitis yearly in the United States, not to mention additional deaths resulting from surgical disasters such as cardiac failure, pulmonary embolism, cerebral hemorrhage, cannot be dismissed lightly as being unimportant or a trite subject. Recently, the Metropolitan Life Insurance Company[19] reported that the mortality of appendicitis among their policy holders, aged one to 74 years, was 3.2 per 100,000 in 1946 compared to 11.5 per 100,000 in 1936.

It is readily admitted that recent statistical studies by Mueller,[20] Sorensen,[21] Ingerslev,[22] Tashiro and Zinninger,[23] Meyer, Requarth and Kozoll,[24] and Jackson,[25] show a declining mortality from acute appendicitis in the large medical centers of the world. Nevertheless, the complications of acute appendicitis and improperly performed appendectomies still kill entirely too many individuals yearly. Seventy-five per cent of appendicitis deaths are attributable to the patient, because of failure to have an appendectomy performed in the interval between acute attacks, to indiscriminate self-medication, to procrastination, and finally to self-administration of strong purgatives. The final 25 per cent of appendicitis deaths must be laid on the doorstep of the medical profession because of our failure to make a prompt and correct diagnosis, our tendency to procrastinate, to use improper surgical technic and judgment, and to exercise poor postoperative care. The first 75 per cent of these needless deaths should be vigorously combated by a program of education of the laity. Monte Reid[15, 16] has convincingly demonstrated that education of the laity in Cincinnati, Ohio, has markedly reduced the former high mortality of acute appendicitis in that city. The final 25 per cent of appendicitis deaths due to inadequate medical and poor surgical care constitute the chief concern of this paper.

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* [illegible] National Assembly, United [illegible] College of Surgeons, Chi[illegible] 1947.

† [illegible] College of Medical [illegible]

DIAGNOSIS

Early diagnosis is imperative. Abdominal pain that persists longer than six hours in a previously well individual demands a thorough investigation to exclude a disease of surgical importance. Rectal and pelvic examinations are of far more diagnostic importance than registering the pulse rate or the temperature by mouth. Auscultation of the chest is equally as important as palpation of the abdomen. The surgeon must train himself to think in terms of anatomy and physiology. The anatomic distribution and area served by the segmental spinal nerves must be constantly recalled. A complete history must be taken and each patient must have a physical examination, followed by a complete laboratory study. Short cuts should never be permitted because sometimes an important fact that would change the entire diagnosis may be missed.

Acute appendicitis most commonly affects young adolescents but it may occur at any age. If there is localization of pain, it is a good sign that probably the appendix is situated at the parietal peritoneum. Typical pain usually begins in the epigastrium and shifts after several hours to the right lower quadrant. Often the patient may be awakened out of a sound sleep by a pain that slowly increases in severity and is of a dull constant aching character. If painful urination develops or hematuria appears, the appendix probably is situated in the pelvis. Vomiting is not an early nor a prominent complaint; usually it makes its appearance *three to four hours after the onset of the pain.* Nausea and loss of appetite in a patient previously enjoying a good appetite is suspicious of the presence of acute appendicitis. One should always inquire if laxatives or enemas have been taken recently. If a history of a gradual onset of constipation, pain and increasing flatulence is obtained, that patient should be carefully watched. Tenesmus frequently is a diagnostic sign of pelvic acute appendicitis or a pelvic abscess. Inquiry as to previous similar attacks is of great importance. The pulse rate is not diagnostic.

The temperature rises slowly from normal to about 101° F. in acute appendicitis and may suddenly drop to subnormal after perforation, only to rise later to 104° F. with the onset of a generalized peritonitis. In intra-abdominal diseases the ratio of the pulse to the respiration usually is more than three to one. A dry tongue is indicative of dehydration, possible toxemia, or sepsis. Commonly a coated tongue associated with foul breath is seen in acute appendicitis. A dull gaze, apathy, with sunken cheeks and eyes, found in a patient who lies in bed without moving and often with flexion of the knee and hip joints are indicative of the possible *presence of a generalized peritonitis associated with an advanced toxemia.*

On request the patient frequently will point to McBurney's point as the site of maximum point tenderness. Distention of the midportion of the abdomen with empty and nondistended lateral pelvic gutters is seen in neglected cases of acute appendicitis associated with a paralytic ileus or a small bowel obstruction. Acute appendicitis frequently causes limitation of abdominal respiration. Gentle palpation of the abdomen reveals involuntary muscular rigidity usually situated in the right lower quadrant. Localized deep tenderness of considerable severity commonly is localized near McBurney's point. Right flank tenderness and muscular rigidity may be indicative of a retrocecal or retrocolic acute appendicitis. Commonly, hyperesthesia in the right mammary line caudad to the umbilicus is elicited. Occasionally a pelvic or an abdominal mass may be palpated. Too vigorous palpation of such an abscess may cause its rupture with rapid development of alarming signs and symptoms of peritoneal shock. A bimanual pelvic examination is mandatory in every nonvirginal woman. There is never any excuse for not performing a rectal digital examination. A right lateral mass that is very painful, or an indurated painful area in the same area, is often indicative of acute appendicitis. Auscultation of the abdomen may reveal a silent one indicative of the presence of intestinal paralysis due either to ileus or peritonitis. Stormy metallic tinkling peristalsis indicates the presence of intestinal obstruction.

Careful examination of the lungs, heart, and reflexes may prevent a grave error in diagnosis. Careful examination of the eyes, ears, nose, mouth, and neck may give the correct diagnosis and prevent an unnecessary operation. The urine examination is of great importance and prevents one from operating upon a case of renal or ureteral disease. My father always disregarded the white blood count if it did not fit into the rest of the clinical picture. Leukocytosis with a Schilling shift to the left and high percentage of juvenile and stab forms, confirms the diagnosis. The blood count should never be the basis upon which to decide for or against operation. The blood pressure is of value to indicate whether a state of collapse is imminent, or it may show the degree of shock present. Posteroanterior roentgenograms of the chest and a flat scout film of the abdomen may give very valuable information. Perforation of a hollow viscus, intussusception, ileus, or intestinal obstruction either in the small or large intestine may be delineated.

Anatomic Location of Appendix. As consultant, called in to see patients with vague and nonclassical signs and symptoms of abdominal pain, it has been my experience to find that no rectal or pelvic examination had been performed by the attending physician because this type of examination might be distasteful to his patient. Such a flimsy excuse for not performing two of the most important examinations when dealing with a case of suspected acute appendicitis is unforgivable. When such an examination is made by the consulting surgeon it facilitates prompt diagnosis and furnishes the surgeon with the exact location of the vermiform appendix within the peritoneal cavity. Conversely, when inexperienced physicians, encounter no evidence of localized point tenderness in the lower peritoneal cavity in the course of a rectal or a pelvic examination, and superf[illegible] of muscle-guarding [illegible], they assume that [illegible] be present.

It must be remembered that the vermiform appendix may assume any location within or adjacent to the peritoneal cavity.[26] In the classical work, "The Vermiform Appendix and Its Diseases," by Howard A. Kelly and E. Hurdon, published in 1905, the various anatomic sites of the appendix are shown.

It is regrettable that many American surgeons apparently have not realized that acute retrocecal appendicitis may mask its symptoms so as to trap the unwary.[27, 28] Commonly, aside from the history, the only positive diagnostic sign which may arouse the suspicion of acute appendicitis, is a marked localized point of tenderness when pressure is made in the right lateral flank behind the cecum. I can call to mind three Doctors of Medicine who were hospitalized in great teaching hospitals, and who died because their attending physicians failed to recognize the presence of an acute gangrenous, perforated, retrocecally placed appendix. Fortunately, I have been able to prevent a lethal outcome in the case of several office nurses of prominent surgeons suffering from acute appendicitis localized in similar sites.

When a patient presents himself with a complaint of a recurring localized, sharp lancelike right lower quadrant pain, with a history of similar attacks in the past and which the attending physician had diagnosed as acute appendicitis, the only proper attitude by the surgeon is one of skepticism. A most careful history and physical examination are necessary together with complete laboratory and x-ray studies to make certain by a process of exclusion that the only structure that could possibly be involved must be the vermiform appendix. Right-sided genitourinary disease, pelvic disease in a woman, diseases of the small or large bowel, cardiac or pulmonary diseases and finally disease of the nerves supplying the right lower quadrant must be painstakingly ruled out.

The surgeon should have a very definite opinion as to the anatomic location of the vermiform appendix before making his operative incision. Commonly, this is made exceedingly simple by the expedient of a rectal or pelvic examination. If both examinations are negative, then, following diversion of the patient's attention, sharp pressure in the right lateral flank will often show the location of an acutely diseased retrocecal appendix. If all three of these diagnostic procedures are negative, the possibility of a partial or complete nonrotation of the cecum should be considered. Therefore, left-sided lower quadrant abdominal pain should not be blandly dismissed as excluding an appendicitis unless chest and flat x-ray plates of the abdomen prove beyond doubt that one is not dealing either with a transposition of the viscera or failure of complete rotation and descent of the cecum into the right lower quadrant.

DIFFERENTIAL DIAGNOSIS

Commonly, a differential diagnosis must be made between acute appendicitis and acute cholecystitis or acute salpingitis. Dependent upon whether complete rotation and normal descent of the cecum has occurred, the inflamed appendix vermicularis may be found in any area of the peritoneal cavity. Acute pelvic appendicitis may have to be differentiated from intestinal obstruction, ureteral calculus, perforated typhoid ulcer, Meckel's diverticulitis, diverticulitis with abscess formation and, in women, salpingitis, ruptured *pyosalpinx, twisted pedicle of ovarian cyst* or pedunculated uterine leiomyomas, hydrosalpinx, and ectopic gestation. If the situation of the appendix is iliac, differentiation may have to be made from mesenteric lymphadenitis,[29] carcinoma of the cecum, psoas abscess, hip disease, a leaking perforated peptic ulcer, and ileocecal tuberculosis. The ascending vermiform appendix may have to be distinguished from a perforated gallbladder, cholecystitis, or a duodenal ulcer.

Often a number of purely medical conditions must be borne in mind lest one be led to operate in a nonsurgical condition. Intrathoracic lesions that may simulate an acute surgical abdomen are angina pectoris, acute pericarditis, acute pleurisy, acute bronchial or lobar pneumonia, acute diaphragmatic pleurisy, and acute pneumopericardium. Renal disease may cause confusion, especially uremia. Tabes dorsalis with gastric or intestinal crises may trap the unwary. Blood diseases such as leukemia or acute infectious mononucleosis may mimic acute abdominal lesions. Retroperitoneal lesions that have proved confusing are acute pancreatitis, rupture of aortic aneurysms, dissecting abdominal aneurysms, retroperitoneal bleeding or extravasations of urine or bile, and retroperitoneal tumors.[30] General diseases often confuse the surgeon, particularly in their early stages. Among these are malaria, lues, influenza, typhoid fever, diabetes mellitus with impending coma, tuberculous, gonococcic or pneumococcic peritonitis and ptomaine poisoning.

MANAGEMENT

No one should attempt to open the peritoneal cavity with a preoperative diagnosis of acute appendicitis unless he is fully qualified to cope successfully with any acute surgical condition which he may encounter. Auchincloss[31] is in complete agreement with this concept. In recent years the performance of an appendectomy has been viewed with considerable contempt and it is not at all strange, but dismaying, to learn that even our hospital interns with only one or two months of training have become so blase that a mere appendectomy is beneath their interest. The experienced surgeon knows that an opera*tion for acute appendicitis can be extremely* simple or one that will tax to the utmost all of his previous surgical skill and years of surgical judgment. For these reasons I have desired to call attention to this subject again in an attempt to crystallize what is considered to be the present accepted treatment in the successful management of acute appendicitis and its many complications.

It is axiomatic that once a diagnosis of either acute or subacute appendicitis has been made an immediate abdominal exploration becomes obligatory. No personal reasons should be permitted to delay operation. Seldom will an appendectomy have to be postponed because of the patient's critical condi-
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It is axiomatic that once a diagnosis of either acute or subacute appendicitis has been made an immediate abdominal exploration becomes obligatory. No personal reasons should be permitted to delay operation. Seldom will an appendectomy have to be postponed because of the patient's critical condition resulting from gross neglect. If when first seen the patient is rapidly improving from his appendicitis, it may be reasonable to postpone an appendectomy for several months and then operate in the interval.[28] Spinal anesthesia is the anesthesia of choice, except in the very young, the aged, or those with marked arterial hypertension. General inhalation anesthetic agents should be avoided wherever possible. The patient's desires as to anesthesia do not constitute a valid reason for not giving a spinal anesthetic.

Incision. In the great majority of males and in females in whom the diagnosis is certain, the muscle-splitting so-called "McBurney incision"[4] (which, in passing, should correctly be called the McArthur incision[5]) should be used routinely with the single modification that the skin incision should be made obliquely in the direction of the skin cleavage planes of the right lower quadrant of the abdomen. Babcock, Hamilton, Bailey,[32] Hoerr,[18] Mueller,[20] Karl Meyer *et al.*,[24] Norris,[34] and Monte Reid,[15, 16] have advocated the use of the McArthur muscle-splitting incision as being the safest of all abdominal incisions in routine cases of acute appendicitis. The only structure of importance in the superficial layers of the wound is the right circumflex iliac artery, which should be palpated with the finger and then carefully mobilized and retracted laterally. If this incision is properly made, there should be little or no need for hemostasis down to the aponeurosis of the external oblique muscle. The only advantage that the McArthur incision possesses is that it keeps the surgeon from meddlesome exploration of the remainder of the peritoneal cavity. The skin incision normally should not be longer than approximately 5 cm. because with such an incision, if gross infection is encountered about the vermiform appendix, the necessity of fighting a postoperative anterior abdominal wall phlegmon is materially reduced.

When the peritoneal cavity is opened the gross surgical pathology should be examined first. The index finger should never be blindly jammed into the wound in an effort to deliver the vermiform appendix without first conducting a preliminary reconnaissance of the conditions presented. Too many patients die needlessly because their surgeons do not observe this basic principle of good surgical judgment, thereby rupturing acute gangrenous specimens by their too hasty and rough mobilizing tactics. It might be a good idea to place a copy of Sir Frederick Treves' well known sketch, entitled, "The Idol with Hands of Clay" in the surgeons' dressing room in hospitals as a grim reminder. This sketch graphically depicts the fatal end of an appendectomy, where the surgeon had "hooked-out" the appendix, only to have it followed immediately by a sudden profound fatal hemmorrhage from the depths of the wound.

Next to delay in getting the appendix removed from the abdomen, many appendiceal deaths in this country result from the improper employment of a right rectus type of incision which was never intended for the removal of the appendices in the great majority of examples of acute appendicitis. Meyer *et al.*[24] state that the nearer the incision is placed toward the midline in instances of acute appendicitis, the higher is the mortality rate. The right rectus incision is likewise one of the most vicious incisions through which to bring to the outside drainage tubes of various types.

The McArthur incision has another marked advantage in that this is the only incision that affords proper exposure in the acutely inflamed and bound down retrocecally situated vermiform appendices. Frequently, in acute retrocecal appendicitis, it is neither necessary to enter nor to open widely the peritoneal cavity in order to perform an appendectomy easily and to care adequately for the operative site.

Appendiceal Stump. It is regrettable that many American surgeons failed to heed the teachings of my former beloved Professor, Dr. H. E. Robertson,[35] who formerly with great distinction headed the Section on Pathologic Anatomy at the Mayo Clinic. Over the years he preached and contended, often futilely, that from a pathologic standpoint the stump of the vermiform appendix should not be invaginated into the so-called "head" of the cecum. Dr. Robertson repeatedly demonstrated that stump inversion invariably leads to the formation of an intramural abscess of the cecum at the site of such inversion. Wayne Babcock[36] agrees with this concept. Such an abscess must drain in one of two directions. It may drain into the lumen of the cecum, in which case no great damage results. But if this collection of pus drains by the other route of escape, namely, into the peritoneal cavity, the patient's life has for the second time been carelessly placed in jeopardy. Wayne Babcock aptly remarks, "An experience of many years has shown how unnecessary it is to use a pursestring suture in the cecum. Indeed, such a suture, in passing through Peyer's patches in the cecum, may drag bacteria into the incision and increase the danger of wound infection." Large series of cases have shown beyond any doubt that the inversion of the ligated stump of the vermiform appendix has consistently resulted in increased mortality and more postoperative morbidity, when comparison is made with similar types of appendicitis in which stump inversion is not done. Likewise, how often have we seen the development of a large fecal fistula resulting from necrosis of the inverted cecal area, postoperatively, witn its resultant grave postoperative morbidity, needless secondary operations and, worst of all, needless deaths.

The opponents of noninversion of the appendiceal stump have proposed to invaginate the stump without ligating it. At first consideration, this method would appear to answer all of the objections which I have raised, but in my personal experience I have seen 7 patients bleed to death because the blood supply to the stump of the vermiform appendix had not been ligated and could not be controlled postoperatively.

Two No. 2 40-day chromic ligatures are applied 0.5 cm. apart at the appendiceal base, tied securely with three square knots and the ends of the ligatures cut 2.0 cm. long. At the present time this is the safest manner in which to treat the appendiceal stump.

Nondrainage versus Drainage, and Chemotherapy. No instance of acute perforative appendicitis, complicated by a diffuse peritonitis should be drained today, because of the availability of specific chemotherapeutic agents and specific antibiotic preparations. I have not drained a single example of acute diffuse peritonitis resulting from acute perforative appendicitis in the past nine years and have had no reason to regret this choice of nondrainage. Crile[13] has substantiated this new concept of deliberate nondrainage. Blain and Kennedy[37] believe that penicillin acts as a detoxifying agent in instances of toxemia resulting from intestinal obstruction. Brown[38] believes that the combined use of sulfonamides and penicillin has greatly lowered the mortality and postoperative morbidity rates in instances of peritonitis. Since the advent of specific chemotherapeutic and antibiotic agents the concept of nondrainage of generalized peritonitis in cases of acute perforative appendicitis, even in patients with a purulent fibrinous peritonitis, has been steadily gaining more converts. Today, surgeons who insist on the routine continuance of intraabdominal drainage are classified as being dangerous and out of date.

Too many instances of postoperative bowel obstruction and wound evisceration have resulted from the routine and unintelligent continued use of rubber drains of one type or another. Farkas[39] reports that all appendices, including those with perforation, were not drained from the peritoneal cavity. The only exception was made in localized abscess formation where drainage was employed. I have been in complete agreement with this concept for over 10 years, and so stated my beliefs in 1938.[28] As one's surgical ability improves with the passage of years, more and more appendices will be removed from appendiceal abscesses without breaking down Nature's protective abscess walls. Every safe effort should be made to remove the diseased appendix at the original operation. Failure to do so increases the mortality and the later necessity of secondary operations. Farris and Romack[40] believe that bacteria are the predominating factor in deaths following "closed-loop" obstructions and that chemotherapy has a marked influence in combating their deleterious effects. In all instances of acute appendicitis complicated by acute peritonitis, either localized or generalized, as well as appendiceal abscesses, intraperitoneal implantation of 5 Gm. of sterile sulfanilamide powder should be routine procedure. The use of sterile sulfathiazole and sulfadiazine powders has been discontinued because of unfavorable experimental evidence and personal experiences which have convinced me that these two preparations are often dangerous to implant either within the peritoneal or the abscess cavity. In certain instances their use has been followed by focal necrosis, toxic hepatitis, as well as sulfonamide crystalluria. The fact that the surgeon can obtain 100 times the wherever possible. The patient's desires as to anesthesia do not constitute a valid reason for not giving a spinal anesthetic.

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Nondrainage versus Drainage, and Chemotherapy. No instance of acute perforative appendicitis, complicated by a diffuse peritonitis should be drained today, because of the availability of specific chemotherapeutic agents and specific antibiotic preparations. I have not drained a single example of acute diffuse peritonitis resulting from acute perforative appendicitis in the past nine years and have had no reason to regret this choice of nondrainage. Crile[13] has substantiated this new concept of deliberate nondrainage. Blain and Kennedy[37] believe that penicillin acts as a detoxifying agent in instances of toxemia resulting from intestinal obstruction. Brown[38] believes that the combined use of sulfonamides and penicillin has greatly lowered the mortality and postoperative morbidity rates in instances of peritonitis. Since the advent of specific chemotherapeutic and antibiotic agents the concept of nondrainage of generalized peritonitis in cases of acute perforative appendicitis, even in patients with a purulent fibrinous peritonitis, has been steadily gaining more converts. Today, surgeons who insist on the routine continuance of intraabdominal drainage are classified as being dangerous and out of date.

Too many instances of postoperative bowel obstruction and wound evisceration have resulted from the routine and unintelligent continued use of rubber drains of one type or another. Farkas[39] reports that all appendices, including those with perforation, were not drained from the peritoneal cavity. The only exception was made in localized abscess formation where drainage was employed. I have been in complete agreement with this concept for over 10 years, and so stated my beliefs in 1938.[28] As one's surgical ability improves with the passage of years, more and more appendices will be removed from appendiceal abscesses without breaking down Nature's protective abscess walls. Every safe effort should be made to remove the diseased appendix at the original operation. Failure to do so increases the mortality and the later necessity of secondary operations. Farris and Romack[40] believe that bacteria are the predominating factor in deaths following "closed-loop" obstructions and that chemotherapy has a marked influence in combating their deleterious effects. In all instances of acute appendicitis complicated by acute peritonitis, either localized or generalized, as well as appendiceal abscesses, intraperitoneal implantation of 5 Gm. of sterile sulfanilamide powder should be routine procedure. The use of sterile sulfathiazole and sulfadiazine powders has been discontinued because of unfavorable experimental evidence and personal experiences which have convinced me that these two preparations are often dangerous to implant either within the peritoneal or the abscess cavity. In certain instances their use has been followed by focal necrosis, toxic hepatitis, as well as sulfonamide crystalluria. The fact that the surgeon can obtain 100 times the blood level concentration at any particular peritoneal site he desires by local implantation of sterile sulfanilamide powder demonstrates the great advantages resulting from this technic. Arnold Jackson [25] recently reported on 15 personal cases similarly treated without drainage with great success. Sorenson,[21] Mueller,[20] and Kaufman and Hersheimer,[33] for their great value, advocate the sulfonamides in appendicitis.

In addition to the employment of sulfanilamide when indicated, I administer routinely in all instances of this type, 1 million units of crystalline penicillin dissolved in 20 cc. of sterile triple distilled water and this solution placed either within the peritoneal or the abscess cavity, as the case may be. The rationale for this added procedure is the fact that the penicillin will successfully combat and inactivate the highly lethal gram-positive bacilli and cocci which would commonly kill the patient and on which sterile sulfanilamide powder would have no appreciable bacteriostatic effect.

The third antibacterial agent which I have added to my routine postoperative care in the past two years is streptomycin. It has been our practice to employ 1.5 Gm. of streptomycin divided into four equal doses once every six hours, along with 100,000 units of crystalline penicillin both being injected intramuscularly deep into the buttocks every three hours daily, using separate syringes, until the patient's temperature drops to normal, the abdominal distention disappears and there has been a bowel movement. Under such a regime and without any type of drainage except from the muscle layers outward in the incision. I have encountered not a single instance of postoperative abscess formation within the peritoneal cavity. No instance of acute appendicitis is given anything by mouth until the abdominal distention disappears, the temperature drops to normal and flatus has been passed. Patients usually are given three intravenous infusions each 24 hours: one intravenous infusion of 1,000 cc. of 5 per cent glucose in normal saline; and two infusions, each consisting of 1,000 cc. of 5 per cent glucose in sterile water to which has been added one ampule of "Solu-B" and 500 mg. of Vitamin C, to insure a rapid and firm healing of the wound. Blood plasma or whole blood transfusions are freely used when indicated. A positive fluid balance and normal blood chemistry components are rigidly maintained.

Sutures. In obvious cases of purulent appendicitis or appendiceal abscesses, the peritoneum may or may not be tightly closed as the case may be. Great care is taken *not* to place sutures in the aponeurosis of the external oblique muscle, in the subcutaneous adipose layer, nor in the skin. Bitter experience in the past has demonstrated the fallacy of attempting to close such grossly contaminated wounds and this is another added blessing of performing an appendectomy wherever possible through the muscle splitting McArthur incision. If sutures are placed in the external oblique aponeurosis in such grossly infected cases they will promptly slough out and there will be a disastrous loss of this important fibrous supporting structure which might lead to an incisional ventral hernia later.

Any sutures placed in the subcutaneous fat or skin will act as wicks to conduct the infection into clean noninfected areas. Under this regime in my own cases of appendectomy, postoperative ventral hernia occurred only once. (This took place 9 months after operation in an elderly, obese individual, 75 years of age, who in the spirit of "his second childhood" insisted upon chopping down trees and swinging a sledge in a gold mine for two months to prove to all concerned that he was as good a man at 75 as he had been at 35.)

The possible exception may be the use of stainless steel wire or annealed rustless steel that has been championed by Wayne Babcock [36, 41, 42] in recent years. When it is necessary to place a drain in the rare instance of a markedly purulent peritonitis secondary to an acute appendicitis, I can unhesitatingly recommend the glass or alloy steel "sump" drain [43, 44] in which there is contained a separate inner suction tube attached to a small gentle "flea"-power suction motor. In the instances in which I have employed Dr. Babcock's sump drain, it has worked perfectly and I have not been faced with a postoperative bowel obstruction nor an evisceration of the incision. The Chaffin-Pratt suction motor frequently has been my "ace in the hole" in critically sick postoperative patients.

Ambulation. In this disease no patient is allowed out of bed *until* he has been afebrile for 36 hours, abdominal distention has disappeared and a bowel movement has occurred. This plan of postoperative management is "old-fashioned," but I have yet to lose a patient from complications directly attributable to too early ambulation. It is obviously folly to get a patient out of bed when nature is doing her utmost to localize and clean up a diffuse peritonitis. To impose upon nature by the breaking down of resistance from too much activity is not good surgical judgment. Too many surgeons are Pollyannas; generally they hope that a duodenal or a Miller-Abbott suction tube will not be needed in their particular patient because it may inconvenience them. Too many case histories are available of fatal terminations where the patient was suffering from a paralytic ileus in which, lamentably, duodenal or Miller-Abbott suction tube drainage was instituted in the last 18 hours of the patient's life. I feel very certain that the great majority of these patients could have been saved if the surgeon had instituted such a type of drainage immediately following surgery and thereby prevented needless toxemia, sepsis, exhaustion and final necrosis of segments of the distended small intestine.

Older and more experienced surgeons will agree that the most dangerous and fulminating types of acute appendicitis one may encounter is acute obstructed retrocecal appendicitis in which a fecalith has blocked off the lumen and thus set up the "closed-loop" type of appendiceal obstruction and gangrene caused by the marked increase of intraluminal pressure.[28] In the presence of an obvious perforated appendix either within a walled-off abscess or in instances of diffuse peritonitis, too many surgeons fail to look for a possible fecalith that may have been extruded through the site of perforation. If such a fecalith is overlooked and not removed at the time of surgery, many grave and commonly fatal postoperative complications are certain to ensue and great is the embarrassment of that surgeon at the postmortem examination of the patient when the pathologist holds up the fecalith foreign body which caused all the complications, ultimately resulting in the patient's death.

Chronic Appendicitis. Unfortunately too many surgeons have not had the benefit of a thorough grounding in surgical pathology and, after an operation, blandly tell the patient's relatives, "Oh, yes, it was very fortunate that I removed the appendix at this time, as the appendix showed chronic inflammation." If we exclude the members of the chronic infectious granuloma group, amebic colitis and a few isolated pathologic curiosities, there is *no pathologic entity* characterized by a long continued chronic inflammation, the surgeon's ideas to the contrary notwithstanding!

Bacteriologic studies on so-called "chronic" appendiceal walls (209 cases), gave 16.2 per cent positive cultures.[45] Inflammation is the chief initiating agent of appendiceal obliteration. This is especially true in specimens derived from individuals under the age of 35 years. Above this age involution may partially initiate or complete the final stages of the obliterative process. The reason why the vermiform appendix is the only portion of the adult gastrointestinal tract to undergo obliteration may be explained upon the basis of inflammation, senescent involutionary tissues, inadequate terminal blood supply, poor peristalsis and inability to overcome infections that elsewhere in the intestine are of trivial importance.[46]

A poll of the leading pathologists in the country substantiates *this opinion and I believe that many* of our surgeons will agree *with this concept.*[47] *There may be early beginning subacute appendicitis* or subsiding subacute *appendicitis but, in the opinion of most of the* eminent pathologists in America *today, chronic* appendicitis continuing for *long periods is pathologically* impossible. The *term,* pathologists explain, means only the *normal involutionary* changes, or the healed scars of previous acute inflammation, which *occur in the* vermiform appendix as one grows *older and* the terminal blood supply to the *appendix* undergoes advancing arteriosclerosis. *Unconsciously* and unintentionally

TABLE 1. SUMMARY OF 12,813 CASES OF APPENDICITIS FOLLOWED BY APPENDECTOMY.

Types	No. Cases Male	No. Cases Female	Number of Deaths	Mortality Percentage
Perforative Gangrenous	413	346	70* No. Deaths since Aug. 1946	9.22
	Total 759			
Simple Acute	1368	1801	10 None Since 1942	0.31
	Total 3169			
Subacute	472	972	9 None Since 1945	0.63
	Total 1444			
Chronic	1469	5972	8 None Since 1945	0.11
	Total 7441			
Totals	3722	9091	97	0.76
	Total 12,813			

* One case not operated on.

many surgeons use the term "chronic" appendicitis in a careless manner. When such an appendix is removed and the pathologist finds only collections of lymphocytes and a few plasma cells in the submucosa (which is the *normal* histologic picture) he is forced to call this "chronic" appendicitis, in order to shield the surgeon medicolegally from certain unscrupulous members of the legal profession. Surely no surgeon today should be guilty of relating that a completely obliterated vermiform appendix was the principal object of his laparatomy, and that by its deliberate removal he protected the patient's life from *future complications.* I have read the 2 cases reported recently by Hugh McKenna.[49] The *only complication* that could conceivably arise in about one patient in 10,000 would be a carcinoid tumor of the appendix, while the complications and mortality from performing an appendectomy carry about ten times greater risk in the hands of even our most competent surgeons. It would be far better to state that in the course of surgery within the abdomen a prophylactic appendectomy was performed to prevent the possible occurrence of future appendicitis.

Above all, American surgeons must constantly strive to be scrupulously honest with their patients and never take the attitude that the vermiform appendix showed "chronic inflammation" and that therefore its removal at that time was a fortunate thing. In my opinion there is no surgical justification for the removal of "chronic" vermiform appendices *unless* it is done for any one of the following reasons: as a prophylactic measure in individuals with histories of previous acute attacks of appendicitis; when competent roentgenologic study of the gastrointestinal tract following a barium G.I. series demonstrates barium remains in the lumen of the vermiform appendix for 72 or more hours after its original ingestion; when there is definite kinking of the appendix; when fecaliths can be demonstrated lying within the lumen; or when definite pain and tenderness over the vermiform appendix can be elicited upon direct palpation under the fluoroscope.

Appendicitis in the Elderly. Great care must always be exercised when dealing with individuals past the age of 50 who complain of abdominal pain. The signs and symptoms of acute appendicitis in persons over the age of 50 are commonly quite bizarre and frequently their pain and evidence of peritoneal irritation are minimal.[30] The mortality and morbidity of acute appendicitis in the aged is markedly increased. One must constantly be on guard to remember that a vague and pecu-

TABLE 2. RELATION OF RIGHT RECTUS INCISION TO MORTALITY RATE.

Types	Percentage of Fatal Cases						
	Right Rectus Incision	Drained Abdominally	With Varying Degrees of Peritonitis	Reoperated Upon	With Post-Operative Bowel Obstruction	With Post-Operative Ileus	With Pulmonary Embolism
Perforated Gangrenous	87.2	77.2	69.0	19.2	14.3	10.0	5.9
Simple Acute	80.9	20.0	10.0	50.0	20.0	25.0	25.0
Subacute	88.8	33.3	33.3	11.1	11.1	0.0	37.5
Chronic	100.0	25.0	25.0	37.5	0.0	37.5	12.5

liar group of symptoms and signs of mild abdominal complaints may in reality represent an instance of acute gangrenous appendicitis. Failure to remember these facts can lead to disastrous consequences. If in doubt, when dealing with an aged individual, it is far safer to make a McArthur exploratory incision and check the appendiceal region.

STATISTICS

The histories of a consecutive series of 12,813 patients in whom a diagnosis had been made of some type of appendicitis and who were appendectomized, were studied at the Hollywood-Presbyterian Hospital, Hollywood, California, between 1933 and August 1, 1947. For purposes of brevity, the essential data of this study have been summarized in tabular form.

Table 1 delineates the distribution of these cases into various categories. In view of the fact that *147 different operators contributed* cases to this study, the mortality rate must be judged charitably. It is of interest that the mortality rate for subacute appendicitis is twice as high as that for simple acute appendicitis. A possible explanation is that the severity of the infection probably was not suspected nor appreciated by the surgeon. There are occasions when the dividing line between acute and subacute appendicitis is exceedingly fine, pathologically.

The causes of 9 deaths in subacute appendicitis are distributed as follows:

Respiratory failure and status lymphaticus	1
Pulmonary embolism	3
Acute cardiac dilatation	2
Mesenteric thrombosis	2
Inability of surgeon to find a retrocecal appendix	1

In the last, the entire cecal area was covered with old fibriotic adhesions. The autopsy surgeon was much more successful.

The data shown in Table 2 substantiate the claim made previously that a right rectus incision is a poor incision through which to cope successfully with an acute appendicitis. The figures present a serious indictment against this incision. The fact that 77.2 per cent of the fatal cases of acute perforated gangrenous appendicitis were drained raises considerable doubt of the value of such treatment unless one is dealing with a completely walled off appendiceal abscess. The post*operative progress of the patient can almost* be forecast: a right rectus type incision was made, acute appendicitis was encountered, appendectomy usually done with a tedious stump inversion, drainage tubes were inserted; on the fourth postoperative day the patient began to develop signs and symptoms of a progressive small bowel obstruction produced by loops of small bowel wrapped around the drains; or a knuckle of small bowel made its appearance upon the anterior abdominal wall of this patient. After a day or so, this patient was taken to the operating room and operated upon, and, lamentably, two days later a necropsy was performed.

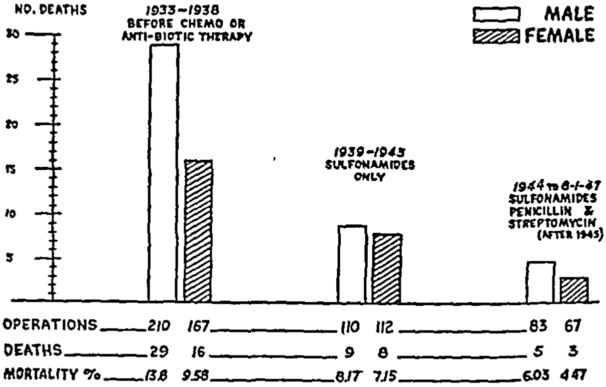
The continued incidence of pulmonary embolism as a factor in postoperative mortality in appendicitis is a matter of grave concern. The simple checking of the calves of the legs on visiting the patient postoperatively would, I am sure, put the surgeon on the alert to recognize when his patient was developing a bland phlebothrombosis. If the phlebothrombosis continued to spread despite the use of anticoagulants, an immediate prophylactic venous ligation near the foramen ovale in the upper thigh is indicated. Equally regrettable has been the failure of American surgeons to realize that the use of *papaverine hydrochloride intravenously* will save more than one-half of their cases of pulmonary embolism, *if* this is injected intravenously within two minutes after the onset of this dreaded complication and many a patient dies needlessly in the postoperative period because of a very small pulmonary embolus which has caused a constricting spasm in the pulmonary artery, but never actually blocked nor plugged the lumen of this large vessel. If the pulmonary arterial spasm can be quickly replaced by a complete vasodilatation, that patient will live. The hesitancy of many American surgeons to perform deliberate ligation of the vena cava near its origin in the area of the lower lumbar vertebrae is regrettable. It is a safe procedure and often life-saving. The table demonstrates the uniformity of results achieved by masterly inactivity.

In this study there were 10 fatalities due to pulmonary embolism in which the attending surgeon did not believe papaverine hydrochloride and atropine preparations were of any material value. Spasmalgin in 1.0-cc. ampules* is used routinely and is kept in sterile jars together with a 2-cc. syringe and a 22-gauge 1½-inch hypodermic needle.

Of great interest was the fact that only 12 (15.72 per cent) of the deaths in this series of 97 deaths had McBurney type incisions and that the average postoperative days in the hospital before death averaged three and one-half times longer than in cases in which more medially placed abdominal incisions had been employed. As a rule irrespective of the degree of inflammatory process present, the deaths in cases with McArthur incisions resulted from conditions other than bowel obstruction, wound evisceration or peritonitis. It appeared to me, therefore, that the data presented in Table 2 should be taken seriously to heart by American surgeons.

Table 3 presents graphically the postoperative deaths in acute gangrenous appendicitis with perforation. It is clear that specific chemotherapy and antibiotic preparations constitute a definite important contributing factor in the progressive lowering of postoperative mortality and morbidity and suggest continued improvement in future. The results suggest that in the future more lives will probably be saved by the postoperative employment of these preparations. The fact that there has not been a death from simple acute appendicitis since 1942 up to August 1, 1947 clearly demonstrates the value of these adjuncts to therapy. No death from acute or "chronic" appendicitis has occurred since 1945, and none from acute gangrenous perforated appendicitis since late in 1946. This corresponds roughly to the advent of streptomycin and our rising courage in the postoperative use of penicillin, thanks to Crile[13] and Wheatley.[50]

TABLE 3. MORTALITY RATE IN ACUTE PERFORATIVE APPENDICITIS.



In Table 4 it will be noticed that abscesses, ovarian cysts, upper respiratory infections,

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* This preparation may be obtained from Hoffman-La Roche, Inc., Nutley, New Jersey.

TABLE 4. NONFATAL COMPLICATIONS AT OPERATION: 5,372 CASES.

Complications	Types of Appendicitis						Totals	Incidence Per Cent
	Perfor. Gang.		Acute		Subacute			
	M	F	M	F	M	F		
Abscesses	150	176	47	29	—	—	402	7.47
Ovarian cysts—various types	0	5	0	84	0	80	169	3.14
Upper respiratory infections	24	13	29	4	46	11	127	2.36
Uterine diseases	0	4	0	53	0	67	124	2.31
Adhesions	2	8	10	30	5	34	89	1.64
Fallopian tube diseases	0	2	0	51	0	29	82	1.52
Pregnancy A. Uterine B. Ectopic	 0 0	 25 4	 0 —	 5 —	 0 0	 16 1	51	0.95
Cervix—uterus diseases	—	—	0	12	0	33	45	0.84
Obstruction—small bowel	4	12	8	7	1	2	34	0.63
Cardiac diseases A. Myocarditis B. Endocarditis	 2 1	 1 2	 0 2	 2 0	 10 3	 5 1	29	0.54
Gall bladder diseases	3	10	1	0	6	4	24	0.45
Hernia— A. Inguinal B. Femoral	 — —	 — —	 7 1	 2 3	 9 —	 2 —	24	0.45
G. U. diseases	3	0	5	2	3	4	17	0.32
Peptic ulcer	1	0	4	1	4	2*	12	0.22
Alcoholism—acute	1	3	1	0	2	1	8	0.15
Pulmonary embolism	—	—	1	2	1	1	5	0.09
Osteomyelitis	—	—	1	0	0	1	2	0.04
Mesenteric thrombosis	—	—	—	—	1	0	1	0.02

* Perforated.

diseases of the uterus, and intraabdominal adhesions constituted the chief complications of appreciable importance. There was an accompanying salpingitis in approximately 1½ per cent of the patients operated on. In this group of 5,372 cases 51 patients were pregnant, 46 of which were uterine in location. The other complications are of interest. Only one case of mesenteric thrombosis that survived but 5 cases of nonfatal pulmonary embolism may be attributed to the prompt and energetic use of intravenous Spasmalgin.

Table 5 shows the important postoperative nonfatal complications in the order of their

TABLE 5. NONFATAL POSTOPERATIVE COMPLICATIONS IN 5,372 CASES IN THEIR ORDER OF FREQUENCY.

Complications	Types of Appendicitis						Totals	Incidence Per Cent
	Perfor. Gang. M	F	Acute M	F	Subacute M	F		
Toxemia	49	38	60	47	4	6	204	3.80
Peritonitis							169	3.14
A. General	26	25	9	5	5	0		
B. Local	9	12	6	5	—	—		
C. Type not stated	10	12	11	4	7	4		
D. Pelvic	1	4	2	10	1	1		
Cardiac disease . . .	14	18	23	9	5	6	75	1.40
Renal disease	17	9	11	6	14	9	66	1.23
Other G.U. diseases	2	8	10	5	9	15	49	0.93
Abscesses: Intra-abdominal	6	12	7	12	—	—	37	0.69
Pneumonia: Various types . .	5	1	14	10	0	1	31	0.58
Paralytic ileus	3	7	3	2	2	2	19	0.35
Infectious diseases.	2	0	2	0	9	3	16	0.30
Parotitis	1	2	3	3	1	1	11	0.20

frequency. Table 6 tabulates the unusual pathologic findings in the entire series of 12,813 appendices removed surgically.

SUMMARY

1. The peritoneal cavity should not be opened unless the surgeon is fully competent and able to cope with any acute inflammatory condition encountered therein. Any lower standard of proficiency than this will result in needless deaths and increased postoperative morbidity.

2. The McArthur (McBurney) incision is the incision of choice in performing an appendectomy.

3. This study has shown that the employment of an incision other than the McArthur muscle-splitting incision. has led to a marked increase in postoperative complications such as wound evisceration. ileus, peritonitis, toxemia and bowel obstruction. Incisions *other* than the McArthur incision have contributed to 80 or more per cent of all of the deaths in this group if the so-called "chronic" appendicitis cases are excluded.

4. The peritoneal cavity should not be drained, except under exceptional circumstances. The less experienced operators should avoid draining the general peritoneal cavity by means of rubber drainage tubes of various types. Only an appendiceal abscess which is completely walled off from the remainder of the peritoneal cavity can be drained safely without the development of postoperative complications some of which may prove fatal. Among these are adhesion formation, localized abscesses and small bowel obstruction due to loops of ileum wrapped around the drainage tubes.

5. The stump of the vermiform appendix should not be inverted as a routine procedure, as this is a definite factor in increased postoperative morbidity and fatal complications.

6. With the advent of specific sulfonamide chemotherapeutic agents and antibiotic preparations such as penicillin and streptomycin, there is no longer any valid reason for the

TABLE 6. UNUSUAL APPENDICEAL LESIONS IN 12,813 CASES.

Lesions	Types								Totals	Deaths
	Perfor. Gang.		Acute		Subacute		Chronic			
	M	F	M	F	M	F	M	F		
Diverticula	2	0	2	5	—	—	0	4	13	0
Mucocele	—	—	1	1	0	1	0	1*	4	1
Endometriosis	—	—	0	2	—	—	0	2 (1*)	4	1
Adenocarcinoma	1*	0	0	2	—	—	0	1	4	1
Tuberculosis	—	—	—	—	0	1	0	1	2	0
Lymphoma	—	—	—	—	0	1	—	—	1	0
Carcinoid	—	—	0	1	—	—	—	—	1	0
Totals	3 (1*)	0	3	11	0	3	0	9 (2*)	29	3

* Death.

employment of rubber drains in the peritoneal cavity as a means of successfully treating acute peritonitis whether localized or generalized.

7. The implantation of 5 Gm. (no more) of sterile sulfanilamide powder and 1,000,000 units of crystalline penicillin dissolved in 20 cc. of sterile distilled water is routinely employed in instances of peritonitis, either localized or generalized. These specific drugs are also placed in all appendiceal abscess cavities. Such individuals suffering from peritonitis are likewise given 100,000 units of crystalline penicillin intramuscularly every 3 hours and 0.37 Gm. of streptomycin dissolved in 5 cc. of triple sterile distilled water every 6 hours until the patient's abdominal distention has disappeared, flatus has been passed, a bowel movement has occurred and, finally, the temperature has remained at normal for 36 consecutive hours. Food and fluids are withheld during this same period, If this takes 10 days, the treatment is continued in this routine manner.

8. In the presence of peritonitis, localized or generalized, in which ileus is diagnosed preoperatively decompression is carried out by the employment either of a Levin nasal duodenal tube or preferably a Miller-Abbott tube immediately after surgical intervention. These suction tubes are then attached to a Chaffin-Pratt negative suction motor. The decompression tube is left in place until all evidence of the ileus and peritonitis has subsided irrespective of how many days it takes

9. The use of pituitrin, pitressin and other drugs causing contractions of smooth musculature has been entirely discarded as being unsafe to use in the presence of ileus or peritonitis.

10. In cases complicated by peritonitis or appendiceal abscess the superficial layers of the anterior abdominal wound are left wide open with no effort made to suture either the external oblique aponeurosis, the subcutaneous adipose tissues, or the skin. Such wounds are left open until all evidence of infection has subsided and then secondary closure is done,

after the manner employed with great success in evacuation and general hospitals during World War II.

11. Early ambulation has no place in acute appendicitis with peritonitis and ileus. The criteria for allowing a patient out of bed in acute or gangrenous perforative appendicitis must be the disappearance of abdominal distention, a normal temperature for 36 hours, the passage of flatus, and a bowel movement.

12. A fecalith should always be carefully searched for in cases of acute perforated appendicitis.

13. The term "chronic appendicitis" is a misnomer as applied in the great majority of appendices so diagnosed. In reality it is a term often used by the pathologist to diagnose the normal involutionary changes commonly encountered in older individuals. A true continuing chronic inflammation of the vermiform appendix is exceedingly rare and occurs most frequently in the chronic infectious granuloma disease group.

14. Sharp, lancinating, right lower quadrant pain generally does not signify disease of the vermiform appendix. Great care must be used to make a correct and definite preoperative diagnosis of malfunction of the vermiform appendix.

15. A report is presented on 12,813 consecutive appendectomies performed at the Hollywood Presbyterian Hospital between 1933 and August 1, 1947. A large number of these (7.441) were diagnosed by the pathologist as "chronic" appendicitis. If for purposes of study this group is excluded, there remains a group of 5,372 cases of definite inflammation from which conclusions may be drawn. The mortality rate in this series, 9.2 per cent for 759 instances of perforated gangrenous appendicitis, is not excessive. This mortality rate has undergone progressive lowering in recent years. The mortality rate of simple acute appendicitis was 0.31 per cent in a group of 3.169 cases so diagnosed by the pathologist. There have been no deaths from this type of appendicitis since 1942. The mortality rate in 1,444 cases of subacute appendicitis was 0.63 per cent, and was attributed to the unusual number of severe postoperative complications: pulmonary embolism, acute cardiac dilatation and status lymphaticus. The mortality in the so-called "chronic" appendicitis group was 0.11 per cent and up to August 1, 1947 no individual so diagnosed and so operated upon has died in this hospital since 1945. Aside from the deaths attributable to the disease and its complications there was one death from bilateral lobar pneumonia, one due to coronary obstruction with subacute myocarditis, one caused by an embolism in the right auricle of the heart, one due to acute dilatation of the heart so proved at necropsy, and one due to cerebral hemorrhage.

CONCLUSION

1. Modern concepts in the better management of appendicitis have been discussed.

2. The histories of 12,813 consecutive appendectomies performed at the Hollywood-Presbyterian Hospital, Hollywood, California, have been reviewed and their data tabulated. Certain lessons can be drawn from this study with decided profit to all surgeons.

SOMMAIRE

La cavité péritonealene sera pratiquée que par un chirurgien de haute compétence et ayant une connaissance nécessaire pour contrôler les états inflammatoires qui l'affronteront. Une connaissance inférieure résulterait en morts inutiles et en augmentation de morbidité postopérative.

L'incision "McBurney" est l'incision de choix pour l'appendectomy. Une étude soignée du sujet nous démontre que toute autre incision entraîne une augmentation des complications postopératoires et contribue à 80% de tous les décès de ce group excluant naturellement les cas désignés "appendicitis chroniques." Le drainage ne peut être fait avec écurité que dans les cas d'abscès appendiceal que, si cet abscès peut être isolé complèment du reste de la cavité peritoneale. Autrement le drainage de la cavité peritoneale a des dangers. Le moignon de l'appendice ne sera pas enfoui comme procédé routinier, car c'est une méthode qui peut entraîner des complications fatales. Avec la découverte des drogues chémotherapeutiques "sulfanilamide et penicilline"; il n'y a plus aucune raison valide pour l'emploi de drains de caoutchoucs dans le traitement de la péritonite aigüe. L'Implantation de 5 grammes (pas plus) de

sulfanilamide stérilisée dissous dans 200 cc. d'eau distilée et d'un million d'unités penicilline qu'on dissous dans 20 cc. d'eau sterilisée et distilée est l'emploi routinier en péritonite local ou généralisé. Les drogues jouent aussi un rôle important dans le traitement des cavités appendiculaires virulentes. Aux malades souffrant d'une péritonite on donne tous les trois heures une injection intramusculaire de 100,000 unités penicilline crystalesse et de 0.37 Gm. de streptomycine dissoute dans 5 cc. d'eau sterilisée, trois fois distilée, tous les six heures tant que la distention abdominale existante est là, et qu'il n'y a eu aucun passage de vents ou de matières fécales, et que la température est réstée normale pendant 36 heures consecutives. Les aliments et les fluides ne seront pas administrés pendant cette période même s'il est nécessaire de continuer cette routine pendant dix jours. Quand l'obstruction intestinale complique une péritonite on aura recours au tube Levin ou au tube Miller-Abbott immédiament après l'intervention chirurgicale. Ces tubes seront laissés en deneure, tant qu'il y aura évidence d'obstruction intestinale et de peritonite. La pituitrine et la pitressine et toute autre drogue causant des contractions musculares sont d'un emploi dangereux en présènce d'ileus ou de péritonite. Dans les abscès de l'appendice, les couches supérieures de la plaia antérieurs abdominale ne seront pas suturées (ces plaies seront laissées ouvertes tant que toute evidence d'infection n'a pas été supprimée; alors on emploira la fermeture secondaire employée avec grand succès dans la dérnière guerre). Avant que le malade puisse se lever après une opération pour appendice aiguë ou gangréneuse, on s'assurera que toute infection abdominale soit disparue, que la température ait été normale pendant six heures consecutive, qu'il y a passage de gaz et matières fécales.

Le terme appendicite chronique est une fausse désignation dans la grande majorité des cas. L'inflammation chronique de l'appendice est très rare. Dans 12,813 cas consecutifs d'appendicite, le patologiste, on fit le diagnostique d'appendice chronique dans 7,441. Il ne reste alors en evidence que 5,372 cas d'inflammation qui permettent de déduire des conclusions. Dans 759 cas d'appendicites gangreneux et perforées, il y a une mortalité de 9.2%. La mortalité de l'appendice noncompliquée fut de 0.31% dans un groupe de 3,169 cas. Dans les cas de ce type, nous n'eûmes aucun décès depuis 1942. La mortalité dans 1,444 cas d'appendice sub-aiguë fut de 0.63% et doit être attribuée à un plus grand nombre de complications postopératoires (embolie pulmonaires, dilatation aiguë cardiaque, status lymphaticus). La mortalité des cas désignés appendicites chroniques fut de 0.11% et nous n'avons aucun cas de mortalité dans les cas de cette nature, depuis 1.945 jusqu'a Aout 1947.

RIASSUNTO

Ritiene che l'incisione—per ogni caso di appendicite—debba essere quella di McArthur (McBurney). Altro tipi di incisione aumenterebbero le complicazioni post-operatorie e contribuirebbero perfino nell' 80% alla mortalita' (ad accezione delle appendicite croniche).

Il drenaggio va posto solo allorquando un ascesso appendicolare e' completamente isolato dalla cavita' peritoneale. Il moncone dell' appendice non dovrebbe essere mai invertito, perche' l'inversione aumenta le complicazioni post-operatorie.

Coll'avvento della penicillina e dei sulfanilaminici non rimarrebbe alcuna ragione plausibile per l'uso di drenaggi di gomma nella cura delle peritoniti acute. L'A. precisa le modalita' del trattamento chemioterapico, inclusa eventualmente la streptomicina.

Consiglia l'uso dei tubi di Levin o di Miller-Abbott, adattati ad apparecchi di suzione, nei casi di ileo complicante la peritonite, mentre sconsiglia l'uso di pituitrina e di altre sostanze stimolanti la motilita' intestinale.

Nelle peritoniti e negli ascessi appendicolari gli stratti superficiali (aponeurosi dell'obliquo esterno, sottocutaneo e cute) della parete addominale anteriore dovrebbero essere lasciati ampiamente aperti. La ferita dovrebbe rimanere aperta fino a che ogbi segno di infezione e' scomparso: solo allora una chiusura secondaria potrebbe essere istituita.

Sopra 12813 successive appendicectomie, il patologo ha trovato 7441 casi di appendicite cronica. Limitando la statistica a 759 casi di

appendicite gangrenosa perforata, la percentuale di mortalita' raggiunge il 9,2%: ma anche questa va progressivamente diminuendo. Nei casi di appendicite acuta, semplice, la mortalita' si riduce al 0,31% sopra un totale di 3169 casi (dal 1942 in poi nessun caso di morte). La percentuale aumenta al 0,63% in 1444 casi di appendicite subacuta. Scende al 0,11% nei casi di appendicite cronica; nessun caso di morte dal 1945 al 1947.

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Tourniquet Amputation*†

STANLEY R. MAXEINER, M.D., F.A.C.S.
MINNEAPOLIS, MINNESOTA

TOURNIQUETS have been applied for centuries for the control of hemorrhage. In the second century A.D., Heliodorus[1] referred to its use in the control of bleeding during amputation of the extremities and many types of tourniquets have since been devised to suit the purpose for which they were intended. In all, compression was used for the sole purpose of controlling bleeding until surgery could be instituted, either by ligation or amputation. We have found no case reports in the literature previous to 1924 in which the tourniquet was applied for the purpose of limiting infection. At that time R. E. Farr,[2] with whom I was associated, reported three cases before the Minnesota Academy of Medicine. One case of gas gangrene of his own and one of the author's so treated survived almost overwhelming infection. The third, similarly treated for virulent infection superimposed upon arteriosclerotic gangrene in the presence of cardiac decompensation, expired from cerebral thrombosis after five days. The extremities were wrapped in formaldehyde solution distal to the tourniquet and encased in a rubber envelope.

We have now treated more than 20 cases by this method which we have modified and improved from time to time. The first decision and perhaps the most important one to be made is that the damage to the extremity is irreparable and that the limb must be sacrificed. Second, in the very poor risk patient in whom a primary classical amputation probably would be fatal, the tourniquet is applied as an expedient in the hope of saving life. Later, the second stage may be completed either according to our technic or, when the general condition of the patient will permit, by performing a classical amputation.

In 1924 the author started using as a tourniquet about 5 feet of ½-inch pure gum rubber tubing which is stretched very tightly and remains tight as it cuts deeply into the tissues. Pain usually is minimal as the pressure from the rubber tubing produces anesthesia of such degree that only moderate sedation is required.

Much has been written in recent years about refrigeration for anesthesia and for the preservation of tissue of impaired vitality. Refrigeration has been used with and without the tourniquet but we have continued to use formaldehyde solution because of the simplicity of its use and the fact that when the part is encased in rubber the process is odorless. We have repeatedly cared for patients so treated in large wards. Recently we used our technic in a Sisters' hospital where the leg had been treated for days by refrigeration. The contrast was convincing when they no longer had to carry pails of ice and water.

From his experience in the armed forces in World War I the author is convinced that many lives could have been saved by the sacrifice of an extremity by the tourniquet technic. We have so treated several patients whose extremities, one or more, have been traumatized so severely that amputation was inevitable. It is truly amazing to observe the minimal systemic reaction, the absence of shock and often the almost immediate improvement following the institution of this procedure. In 1941 I stated,[3] "During a recent trip south I saw an article in the San Antonio paper to the effect that an airplane pilot had crashed and sustained such a mutilating injury to both legs that double amputation was necessary. The article further stated that the pilot promptly died following the shock of the accident and the operation." We firmly believe that in war or peace, and especially in industrial and traffic accidents, the tourniquet technic affords a temporary expedient, a procedure of minimal severity, at a time when definitive surgery would be hazardous. The tourniquet may be left on for days and the rubber tubing will complete a guillotine operation without shock; or a secondary elective operation may be performed at an optimum time. Major Paul Adolph[4] states that in China they used the tourniquet to obtain preoperative improvement before amputation in the severely toxic patient who may have been lying out on the battlefield for two to three days. The lives of Chinese soldiers, whose extremities were badly mutilated and infected, were saved when the delimiting tourniquet was employed.

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* From the Department of Surgery, University of Minnesota Medical School, Minneapolis.

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INDICATIONS

First, there must be the necessity for an amputation as a life-saving procedure in the presence of forbidding surgical risk. These indications all exist in the presence of (a) severe trauma with irreparable damage to an extremity of a patient who is suffering severe shock from loss of blood or the magnitude of his injuries; (b) in the presence of virulent infections, especially gas gangrene, and (c) in the presence of gangrene due to diseased peripheral circulation with superimposed infection, or concomitant diabetes or concomitant critical heart disease.

Necessary equipment consists of the following:

Pure gum rubber tubing, 5 feet.
White cotton, sterile, one roll.
Dental rubber dam, sterile.
New rubber draw sheet, one
Formaldehyde solution, 10 per cent, 1 gallon.
Roller bandage, 4-inch, one.

TECHNIC

The procedure may be employed either in the operating room or in the patient's bed. The latter has been found to be a decided advantage in critically ill patients with gangrene complicating diabetes or heart disease. We have repeatedly found intravenous morphine or morphine and scopolamine to furnish adequate anesthesia. Likewise, pentothal sodium has been very satisfactory.

The skin of the extremity is first painted with antiseptic solution several inches above and below the site of application of the tourniquet. The dental rubber dam or a strip of pure gum rubber, 6 to 8 inches wide and long enough to encircle the extremity and overlap a few inches, is placed so that its lower border is at the site of amputation. Next, the rubber tubing is tightly stretched and wrapped about the site of amputation just including the lower border of the rubber dam. Each turn of the tubing overlaps the one below so that the constricted area is as narrow as possible. The ends of the tubing are secured by tying together firmly so that they cannot possibly slip. The extremity distal to the tourniquet is next wrapped with a goodly quantity of white cotton. It is well to use the cotton in abundance. The new rubber draw sheet is next applied so that the extremity may be securely enclosed. The cotton is next saturated with about two quarts of formaldehyde solution and the closure in the rubber sheet completed and held fast with the 4-inch bandage. The rubber dam is next turned distally, sealing the upper opening of the wrapped sheet, and held securely by a few laps of the bandage. By this means the extremity below the tourniquet is preserved in a laboratory solution which renders the gangrenous part odorless, nor is there any odor from the formaldehyde. We have repeatedly cared for these patients in wards without complaint.

POSTOPERATIVE CARE

General supportive treatment may be carried out as usual. Transfusions and infusions may be used as desired, and antibiotics if indicated. There is no interference with the routine treatment for the patient's condition of shock, diabetes or heart disease. Mild sedation usually is adequate since, in only a few hours, the gradual compression of the tourniquet produces pressure anesthesia. This feature has almost been the rule although one or two patients have required greater amounts of sedation.

Usually once daily the rubber envelope is opened slightly and one to two pints of formaldehyde are added to assure against odor from the gangrenous part.

SECONDARY PROCEDURES

After the tourniquet has been applied and supportive treatment instituted the condition of the patient may improve to such a degree that the surgical risk is lessened. Two alternatives are then presented:

1. A classical amputation with flaps fashioned above the tourniquet. This is particularly applicable to crushing injuries not accompanied by severe debilitating disease. Naturally, it is the more rapid and the more ideal method with definitive stump in selected cases.

2. The continued action of the elastic rubber tubing for 8 to 10 days will compress a groove through all the soft tissues to the bone. There remains only a hard dry cuff over the bone, completely free of sensation. As a result, a Gigli wire saw may be placed in this groove immediately above the tourniquet and the remaining tissue and bone cut across without anesthesia. The result is a guillotine operation. Usually the skin edge and a layer of muscle eventually separate due to the crushing. Occasionally at this time we divide the bone several inches higher under local anesthesia and use adhesive traction to pull the soft tissues together. One may choose, however, to dress the stump aseptically and at a later date perform a plastic operation, removing adequate amounts of bone and muscle to permit the skin edges to be approximated loosely by through and through sutures. Though more time-consuming, the latter procedure will permit the saving of life in a larger number of amputations complicated by sepsis and severe debilitating disease.

MORTALITY

This procedure is an expedient made available in the critically ill patient in whom the classical operation of choice would be too hazardous. The application of the tourniquet and dressings produce no shock. In no patient have we observed any direct adverse symptoms No deaths, I believe, can be attributed directly to the procedure when followed as described. One death occurred during anesthesia for severing of the painless compressed bed of the tourniquet. Most deaths have been due to the debilitating disease from which the patient suffered. Some who survived are, we believe, definite salvage attributable to the method.

Early in our experience we always had another tourniquet ready for possible secondary hemorrhage but none has ever occurred.

With the 6 cases previously reported[2, 3] and the present 14, there are 20 cases on record treated by this method. Statistics of the 20 cases indicate there have been six deaths, or a mortality of 30 per cent, none of which can be attributed to the method.

CASE REPORTS

CASE I. Mrs. E. J. was seen in consultation with the late Dr. W. Moir. This patient, 72 years of age, entered Asbury Hospital on Nov. 17, 1941. She had been a diabetic for years. For two months she had had a progressive gangrene of the left third and fourth toes. Blood sugar was 286 mg. per cent. On Nov. 27, 1941, an amputation was done by Dr. Moir at the tarsometatarsal joints, removing the gangrenous area. Infection aggravated her condition and her temperature rose to 103° F. on the third postoperative day. On the eleventh and twelfth postoperative days the patient was delirious. Temperature was 102° F. Sugar was very difficult to control.

On the twelfth postoperative day a tourniquet was applied in the patient's bed and the leg wrapped in formaldehyde dressings. Twenty-four hours later her temperature was normal, delirium had cleared and the diabetes was more readily controlled.

Ten days after application of the tourniquet the leg was amputated. The bone was divided at a higher level and the skin edges loosely approximated. This patient recovered and returned home about three weeks later with the stump nearly healed.

CASE II. Mr. K., aged 68, male, married, gave a long hisory of cardiac disease. His heart had been irregular for years. On Feb. 18, 1944, he stated that he had had a mild stroke two years previously. During the past year he was better and worked daily. This morning when he got up he began to have numbness in his right foot, then blanching and severe pain. He was hospitalized and an iliac embolectomy was performed by Dr. H. Hoffert and myself with complete recovery.

The patient developed the same symptoms with pain, numbness and cold right leg on Sept. 24, 1945. He was seen late by Dr. A. Cardle who stated that his heart was fibrillating and his condition was not good. When seen by me he had gangrene of his right leg. The electrocardiogram indicated the presence of (1) auricular flutter, (2) myocardial damage, (3) left axis deviation and (4) coronary disease.

On Sept. 28, 1945, the patient's condition was not good and he was complaining of very severe pain in his right leg. A rubber tourniquet was applied and the leg wrapped in formalin. During the next two days the patient had almost no reaction and required only two hypodermic injections for relief of pain during the first 24 hours. Nine days postoperatively his condition had improved to such a degree that he was taken to the operating room and the amputation completed by Dr. Hoffert. The bone was divided at a higher level and adhesive traction brought the skin edges together. He was discharged from the hospital 13 days later with the stump partially healed. He was subsequently fitted with an artificial limb.

CASE III. Mrs. D., aged 73, entered St. Mary's Hospital Sept. 14, 1943. The history and physical examination revealed hypertension, left heart failure and severe diabetes. She had a gangrenous left foot which produced a severely toxic effect. Her electrocardiogram was normal but the x-ray revealed cardiac enlargement and pulmonary congestion. Sixty-five units of insulin failed to keep her urine sugar below 3 to 4 plus. She developed a severe infection, rapidly spreading into the gangrenous foot, and her temperature rose to 102° F. plus. On Sept. 21, 1943, a tourniquet was applied below the knee and the distal segment wrapped in formalin, encased in a rubber sheet. On Sept. 22, 1943, 24 hours later, her temperature was normal, she had no shock or ill effect and almost no pain from the application of the tourniquet. Nine days later the amputation was completed with a Gigli saw without anesthesia. There was more slough at the end of the guillotine stump than usual and one week later, when the patient's condition permitted, she was taken to the operating room and, under local anesthesia, the bones were divided at a higher level and skin flaps fashioned and loosely approximated. The patient recovered slowly and returned home with the stump nearly healed.

CASE IV. Mrs. J., reported through the courtesy of Dr. L. K. Buzzelle, was an elderly woman who had a severe heart attack in California. Several weeks later she was removed from a train in Minneapolis and taken to Asbury Hospital in a semiconscious state. She developed an embolic gangrene of the left leg and was in very critical condition. Because of her severely toxic condition, amputation was advised and because of her critical state, a tourniquet amputation was selected as the least hazardous.

A tourniquet was applied June 15, 1945, and the leg wrapped as usual. There was no shock or deleterious effect from the procedure and on the tenth postoperative day the amputation was completed. Traction was used on the skin of the stump. She weathered her surgery without event but five days later had a hemiplegia from which she expired. Autopsy revealed coronary sclerosis, arteriosclerosis, hypertensive kidney disease and, as the immediate cause of death, cerebral hemorrhage.

CASE V. Mrs. C. was seen in consultation with the late Dr. Salt. This patient, 49 years of age, married, was in a pitiful state when seen by me. She had sustained a fracture of the right hip which was treated by open operation and mechanical fixation with evident success. Subsequently it became necessary to remove the screws, and the wound later became infected. She developed an osteomyelitis with destruction of the neck and upper shaft of the femur. When seen by me the patient was a confirmed drug addict who cried out under the slightest examination. Her leg was flail and turned if not supported. Nursing care was a problem as she ate little and had fallen away badly in weight. It was almost impossible to turn her or care for her.

Amputation was advised but none believed she could tolerate an operation of election. As a result, a tourniquet was applied under pentothal sodium at a level 3 inches below the greater tuberosity on March 20, 1945. She had a stormy time for several days but 16 days later under the influence of morphine sulfate, the amputation was completed in the patient's bed. The leg healed slowly and two months later she was discharged from the hospital. The stump was nearly healed and she was no longer taking any drugs. She was eating well and had gained weight.

Case VI. Mr. F., male, aged 57, married, stated that he had had diabetes for nine years which was controlled by diet. He developed a sore on the outer side of his right foot three years ago which responded but little to treatment. Three weeks ago the foot became progressively worse with swelling and discoloration, and a moist gangrene involved the foot.

When seen by us he had a swollen, moist gangrenous foot with streaks extending well up the leg. On Jan. 13, 1946, his temperature was 101° F. and pulse, 100. Urine revealed sugar, 4 plus; his blood sugar was 258 mg. per cent; white blood count was 33,000. The next day his condition was worse and his temperature rose to 102° F. At that time the first stage of a tourniquet amputation was instituted. At the end of 24 hours his temperature was normal, pulse, 75 to 80 and the sugar in his urine was 2 plus. He required only one hypodermic injection in the first 24 hours and one daily controlled pain during the first few days.

Ten days later the patient's condition was excellent and a Gritti-Stokes operation was performed. There was little reaction to either operation and the patient was discharged 16 days later with primary healing.

Case VII. Mr. J. McM., aged 61, was admitted to the hospital quite toxic and incoherent. We obtained the information that he had had a painful foot for six weeks but had continued to work on a farm. During the past week the middle toe of the right foot became black and the pain was so great that he could not be up and about. When seen by me he was very toxic, confused mentally and complained of intolerable pain in his foot and leg. He presented a swollen right leg with a typical picture of moist gangrene extending to just below the right knee. Cellulitis was starting up the thigh. His blood sugar was 188 mg. per cent but he had 3 plus sugar in his urine.

On Dec. 31, 1947, the first stage of a midthigh tourniquet amputation was performed. He experienced no shock and no noticeable ill effect. His blood pressure remained 120/60 throughout. Six days later the amputation was completed without anesthesia and a sterile dressing applied over a guillotine stump. One week later when the patient was up in a wheelchair he suddenly expired from coronary occlusion.

Case VIII. Mrs. K., a middle aged woman who was in excellent condition, was skillfully operated upon by another surgeon for a fibromyoma of the uterus. Four days later she developed severe pain in her right leg with blanching, numbness, and reduced temperature; pulsation in the arteries of her foot was absent. An embolectomy was done but gangrene developed. Two days later a guillotine amputation was done 6 inches below the knee where the circulation seemed good. The stump became septic and the flaps sloughed. She had chills and severe reactions from all transfusions and one month after the embolectomy she became delirious, with temperature to 103° F. and pulse 140. Her condition was so serious that she undoubtedly could not have stood a surgical midthigh amputation. A rubber tube tourniquet was applied and the temperature fell and delirium improved. She continued to have pain, however, and her condition remained poor so that when her temperature again rose to 102° F. she was taken to surgery and, under general anesthesia, a guillotine amputation was completed. Although her convalescence was stormy and slow she made a complete recovery. In this instance I believe the tourniquet delayed amputation and improved her general condition enough to permit a successful guillotine operation.

Case IX. This patient, a male aged 75, entered the University of Minnesota Hospital in very poor condition. He was completely studied and unrelated findings will not be reported. His hospital diagnoses were (1) diabetes, (2) arteriosclerosis, (3) coronary heart disease and (4) gangrene of left leg. The patient complained bitterly of pain in the gangrenous leg, his temperature was moderately elevated and there was mild sepsis.

Morphine and scopolamine were administered intravenously; a tourniquet was applied and the leg wrapped in formalin. There were no unusual reactions but the patient's temperature remained elevated and the roentgenogram suggested the possible cause to be pulmonary. During the completion of the second stage under anesthesia, the patient expired. The autopsy revealed acute atelectasis to be the immediate cause of death.

Case X. The reports of this and the following cases are made through the courtesy of Dr. R. Pogue, Watertown, Minnesota.

This elderly, very frail female, aged 75, a severe diabetic, developed gangrene of her left foot. She suffered severely for a long time and was confined to her bed because her family objected to amputation. She became moderately septic with 4 plus sugar in her urine and which was controlled with difficulty by insulin. I do not believe an elective midthigh amputation could have been done successfully on this poor-risk patient. As a *result a tourniquet was applied, there was no* reaction and her insulin requirement dropped instantly. Ten days later her condition was greatly improved and the second stage was done under local anesthesia, dividing the bone at a higher level and bringing the skin loosely together. She had excellent healing and made a splendid recovery.

Case XI. This patient, a male 65 years of age, in January, 1947, complained of severe pain in his left foot where he had developed two ulcers. The patient was a severe diabetic with 4 plus sugar in his urine, poorly controlled with large doses of insulin. The infection progressed and his temperature rose to 102° F. On Feb. 20, 1947, a rubber tube tourniquet was applied 6 inches below the knee and the leg wrapped in a rubber pillow filled with chopped ice. Almost immediately his temperature returned to normal and the insulin requirement was cut by half. Eleven days later, after intravenous administration of morphine, the leg was severed with a Gigli saw. Insulin was discontinued and the patient experienced an uneventful recovery.

Of unusual interest in this case was the fact that Dr. Pogue was away and instructions were given over long distance to his associate who had never seen the method employed.

CASE XII. Mr. L. B., 70 years of age, married, was a printer by trade. He entered the hospital because of unbearable pain in his left foot and leg. He states that he had repeated anginal attacks since 1942 and one and one-half years later suffered a right hemiplegia. His hospital diagnoses were (1) arteriosclerotic heart disease, severe, (2) thrombosis of left femoral artery, (3) dry gangrene of left heel and toes of left foot, and (4) hemiplegia, right, secondary to cerebral embolism. On Jan. 31, 1947, under morphine and scopolamine given intravenously, a rubber tube tourniquet was applied. His temperature remained elevated and he expired four days later. Autopsy revealed (1) bronchopneumonia, (2) coronary sclerosis, generalized, (3) arteriosclerosis, generalized.

CASE XIII. This case is reported by courtesy of Dr. W. White.

This male, aged 78, had suffered from (1) generalized arteriosclerosis, and (2) coronary arteriosclerosis and senility. He developed an acute coronary occlusion and was bed-fast. He fell out of bed and injured his left leg. The injury was followed by numbness in the leg for several days, and then by the development of an acute gangrene with very severe pain. Because the disease was progressive and pain almost intolerable, amputation was advised.

A rubber tube tourniquet was applied just above the knee. Eight days later the amputation was completed. The patient lived five days longer and expired in a state of general exhaustion and loss of strength.

CASE XIV. This is probably one of the outstanding cases of this series and proves the value of the method in trauma.

The patient, male, aged 65, was crossing the railway tracks to his place of business when he was hit by a locomotive engine. He was taken to the Minneapolis General Hospital in severe shock, where he was given 750 cc. of pooled plasma. He was then transferred to Asbury Hospital where he entered our care.

Examination revealed the following injuries: (1) Crushing of the right foot with extreme mutilation of the tarsal and metatarsal bones. (2) Dislocation with compounded injury of the left ankle. (3) Fracture of the right pubic ramus, of the right ilium, and separation of the right sacroiliac. (4) Fracture of the neck of the left femur. (5) Vertebral processes fractured on the third and fourth lumbar vertebrae. (6) Fifth, sixth and seventh ribs on the left side fractured and the sixth and seventh ribs on the right side fractured.

Plasma and blood transfusions were administered together with other supportive measures and as soon as his condition would permit, a debridement of the left ankle was done. The left ankle joint which was widely open, was freely irrigated. The dislocation was reduced and the wound closed with only a small drain. To maintain reduction of the ankle and at the same time keep the fractured femoral neck from displacing, a Kirschner wire was passed through the left os calcis and traction applied. We were convinced that surgical amputation of the irreparable right leg might well result fatally in one so severely injured. We applied a rubber tube tourniquet about the junction of the lower and middle thirds of the calf and wrapped the distal portion in a formalin dressing in a rubber sheet. The patient responded well to supportive treatment and on the eighth day the leg was severed with a Gigli saw without anesthesia. Eleven days later he developed a severe thrombophlebitis involving the left leg. Ten days after the onset of the phlebitis we did an open reduction of the left hip and anchored the fractured ends with three large screws.

One month after the injury the left ankle was healed, the right hip had been secured by internal fixation and the guillotine stump of the right leg was healing well. One hundred days after the administration of the pooled plasma he developed acute infectious jaundice. The guillotine stump eventually was closed by a minor plastic operation under local anesthesia.

It is now one year since the accident and the patient is quite well and wears a well fitting artificial leg. The left hip also is firmly united.

Since writing this paper a report has been received from the Minneapolis General Hospital through the courtesy of Dr. E. A. Regnier, in which it is stated that the tourniquet was applied in 20 cases with 16 deaths, or a mortality of 80 per cent. The high mortality rate is due to the fact that the tourniquet operation was used only in almost moribund cases who would tolerate only ice anesthesia and in whom general or spinal anesthesia were definitely contraindicated. They also conclude, however, that in no case could death be attributed to the use of the tourniquet.

CONCLUSIONS

The tourniquet amputation is an expedient to be used in those cases in which an extremity must be sacrificed but in which a classical amputation would be extremely hazardous in ence of forbidding surgical risk. The niquet may be used for a few days only ch time a classical operation may be at the improvement in the patient's cal state warrants, or it may be allowed main on until a guillotine amputation has n accomplished except that it is necessary to divide the insensitive, compressed ue and bone. The odor from the gangrenous extremity is prevented by the use of aldehyde solution. We are convinced by own experience that by this method lives e been saved which might otherwise have n lost.

SOMMAIRE

L'emploi pour amputation de tourniquets un expédient qu'on peut employer dans cas où une extremité doit être sacrifiée ou même dans lesquelles une amputation classique est dangereuse vue la présence de risques chirurgicaux interdits. Le tourniquet peut être employé pendant plusieurs jours et s'il il a amélioration de l'état physique du malade, il sera permis de faire une opération classique on peut laisser le tourniquet en place jusqu'au moment où l'amputation guillotine sera accomplie, et alors il sera nécessaire de diviser les tissus comprimés et l'os ou les os. L'odeur la gangrène peut-être controlée par l'emploi d'une solution de formaldehyde.

Notre expérience nous a convaincus que tte méthode permet de sauver des vies qui autrement seraient perdues.

RIASSUNTO

L'amputazione con il laccio elastico e' un pediente al quale si puo' fare ricorso nei casi in cui un'estremita' deve essere sacrificata, ma nei quali un' amputazione chirurgica immediata riuscirebbe troppo pericolosa.

Il laccio va applicato solamente per pochi giorni, fino a che un amputazione classica puo' essere eseguita in vista delle migliorate condizioni generali, oppure fino a che i tessuti morti, divenuti insensibili, possono essere semplicemente asportati. L'odore proveniente dalla gangrena puo' essere prevenuto dall'uso di soluzioni di formaldeide.

L'A. si dichiara convinto che con questo metodo numerose vite—altrimenti sacrificate con interventi chirurgici intempestivi—sono state invece risparmiate.

SUMARIO

La amputación fisiologica por medio del torniquete es un procedimiento que se debe de usar en todos los casos que es posible practicar una amputación clasica debido al estado serio del paciente. El torniquete se debe de aplicar por unos pocos días y hasta que la condición del paciente haya mejorado lo suficiente para permitir la intervención quirurjica. El mal olor que proviene de la *extremidad gangrenosa se puede evitar* con el uso de una solución de formalina. En nuestra experiencia, este metodo ha salvado vidas que de lo contrario se habrian perdido.

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CONCLUSIONS

The tourniquet amputation is an expedient to be used in those cases in which an extremity must be sacrificed but in which a classical amputation would be extremely hazardous in the presence of forbidding surgical risk. The tourniquet may be used for a few days only at which time a classical operation may be done if the improvement in the patient's physical state warrants, or it may be allowed to remain on until a guillotine amputation has been accomplished except that it is necessary only to divide the insensitive, compressed tissue and bone. The odor from the gangrenous extremity is prevented by the use of formaldehyde solution. We are convinced by our own experience that by this method lives have been saved which might otherwise have been lost.

SOMMAIRE

L'emploi pour amputation de tourniquets est un expédient qu'on peut employer dans le cas où une extremité doit être sacrifiée ou même dans lesquelles une amputation classique est dangereuse vue la présence de risques chirurgicaux interdits. Le tourniquet peut être employé pendant plusieurs jours et s'il il y a amélioration de l'état physique du malade, il sera permis de faire une opération classique. On peut laisser le tourniquet en place jusqu'au moment où l'amputation guillotine sera accomplie, et alors il sera nécessaire de diviser les tissus comprimés et l'os ou les os. L'odeur de la gangrène peut-être controlée par l'emploi d'une solution de formaldehyde.

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Preliminary Ileostomy as an Important Aspect of Colon Surgery Based on Thirty Years of Clinical Experience*

ALFRED A. STRAUSS, M.D., F.A.C.S., F.I.C.S.
CHICAGO, ILLINOIS

IN no field of abdominal surgery has there been so much progress in the last 25 years as in colon surgery. Our statistics show that the mortality rate in 450 cases of three-stage colon resections with preliminary ileostomy performed before 1941 was as low as 2 per cent. The mortality rate in 150 cases with two-stage resections during this period varied between 10 to 15 per cent. With the use of sulfasuxidine in 1941 the mortality rate in 300 colon cases with primary resections was somewhere between 1.5 and 2.5 per cent, but we continued to use the three-stage operation with preliminary ileostomy whenever indicated. In 150 cases of colon resections after 1941 results were the same as with primary colon resections with chemotherapy. The mortality rate in 600 cases with three-stage colon resections was no higher than the mortality rate in 300 cases of primary colon resections with chemotherapy.

At first, because of the risk of infection in colon surgery, operations such as the two- or three-stage Mikulicz procedure were advocated in which the colon and the cancerous portion of the bowel were exteriorized and the growth, as well as the bowel adjacent to the growth resected. Results indicated, however, that the Mikulicz procedure was not very satisfactory since it is often impossible to exteriorize the lesion in individuals with short and fatty mesentery and a round abdomen. Since wide resection could not be accomplished, this operation was almost entirely discarded because of a higher incidence of infections of the abdominal wall and within the peritoneal cavity, local abscesses as well as a higher percentage of local recurrence of the carcinoma from mesenteric glands which could not be excised.

Following the Mikulicz procedure, an operation known as obstructive resection was developed in which the carcinomatous portion was exteriorized and resected with obstructive clamps. This procedure also was unsatisfactory because in many instances insufficient bowel was resected on each side of the lesion, with local recurrence of the carcinoma as a result.

Finally, the operations of preliminary cecostomy and transverse colostomy were devised to divert the fecal stream, permitting wide resection of the cancer and the adjacent colon with all the involved mesentery. These operations have certain other disadvantages. Since the fecal current can be only partially sidetracked, both procedures are followed by a large percentage of complications at the site of resection and anastomosis. As a result, the tissue of the bowel breaks down and intraperitoneal abscesses develop which often require further extensive surgery.

Simple Loop Ileostomy. Our experience with simple loop ileostomy dates from 1914 and 1915. We have used it not only as a preliminary operation for resection of the colon for carcinoma in preference to the customary transverse-colostomy or cecostomy, but also for injuries to the colon from bullet and gunshot wounds, as a method of decompression for an acute obstructed colon, and for severe acute terminal ileitis, ileocolitis, ulcerative colitis and ruptured diverticuli. It is a very simple procedure and *surpasses* cecostomy or transverse colostomy for the following reasons: (1) it achieves the decompression much better than the other procedures: (2) there is less risk of infection from the spilling of contents into the abdominal wall or peritoneal cavity; (3) it shuts off the fecal current completely; and (4) the results are more satisfactory.

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Simple loop ileostomy can be carried out through a gridiron incision and the closed wound then surrounded with vaseline around the ileostomy. The ileostomy is opened transverse to the longitudinal axis 4 inches from the ileocecal valve, and the colon decompressed before the patient leaves the operating table.

We have found that if an ileostomy is done for stab or gunshot injuries of the left side of the colon, the infection is arrested and the temperature subsides. The ileostomy causes the distended colon as well as the ileum to contract and collapse, shuts off the fecal stream through the colon and prevents the passage of the end products and gases of the infected colon through the infected wound. We have always used it in advanced cases of peritonitis, especially those in children, where there is a marked distention of the small bowel as well as the large bowel. It collapses the ileum as well as the colon, the patient becomes less toxic and the infection subsides.

One of its greatest values is as a preliminary operation in ulcerative colitis. If done early enough, it may even save the colon, and the ileostomy can be closed several years later.

There is probably no condition where it has shown more brilliant results than in late and undiagnosed cases of ruptured diverticuli of the left side of the colon where a severe infection is present in the abdomen. Our statistics show that if an ileostomy is done immediately, in addition to drainage of the left side of the abdomen, many lives may be saved.

It is also of great value in cases of neglected obstruction from an annular carcinoma or other pathology. We prefer it to cecostomy or transverse colostomy since it is simpler to lift out a loop of ileum than the cecum. The cecum usually is so distended that it ruptures when it is brought out of the abdomen or, when it is opened, recedes so quickly that some of the contents spill into the peritoneal cavity. These difficulties are not encountered when a simple loop ileostomy is done since the colon is decompressed with a rectal tube through the ileocecal valve while the patient is still on the operating table

Chemotherapy. The mortality in colon surgery has been lowered with chemotherapy since it permits a primary resection of the affected bowel by the closed method after oral administration of sulfasuxidine and sulfathalidine 5 to 10 days before surgery. This was most satisfactory except in cases of annular constricting carcinoma with marked narrowing of the bowel lumen and marked hypertrophy and inflammation of the bowel wall above the carcinoma. In these cases, even with sulfasuxidine and sulfathalidine, the anastomosis often leaks and an infection occurs in spite of chemotherapy. Therefore, if there is the slightest question about the viability of the bowel and its ability to heal after primary resection and anastomosis, we always perform a temporary ileostomy in addition to the resection in order to safeguard the anastomosis, prevent infection and a long delayed recovery due to wound infections or local abscesses.

Even though we have achieved excellent results with the primary closed method of colon resection in conjunction with chemotherapy, we feel that too much stress has been laid on the value of sulfasuxidine and sulfathalidine in colon surgery while ignoring other valuable adjuncts to therapy. Important preoperative measures such as thorough cleansing of the bowel with oil retention enemas, magnesium sulfate, and suction apparatus, have not been properly or adequately emphasized.

Rectosigmoid Resection. We also believe in very extensive resections of low rectosigmoid carcinomas, and have found that in many cases it is much easier to do an open anastomosis after the resection of the mass in preference to a closed resection. Preliminary ileostomy, or ileostomy at the time of resection is important in these cases since there is less danger of complications from wound infections, and local abscesses in the pelvis. We feel that preliminary ileostomy is invaluable to the general surgeon who does just an occasional colon resection.

In complicated cases where massive resection is necessary not only of the colon but also of adjacent organs when these are involved (kidney and spleen, loops of small intestine grown into the mass, stomach) it is most advantageous to perform a preliminary ileostomy or an ileostomy at the time of resection since it shuts off the fecal current. This is especially so if the patient is in poor condition. After a period of 10 days to two weeks of preoperative therapy with sulfasuxidine and sulfathalidine, a radical resection can be done. Irrespective of chemotherapy, ileostomy is of great value in these cases.

In older, poor surgical risk patients with extensive lesions of the colon, ileostomy is an important preliminary procedure since it allows the surgeon to do a radical resection with a primary anastomosis two or four weeks after the inflammation around the carcinoma has subsided. After careful roentgenologic examination the closure of the ileostomy can be carried out six or eight weeks later.

Our statistical records show that even before the advent of sulfasuxidine and sulfathalidine our mortality rate was very low as compared to results with other procedures. We feel that this is not due to superior surgical skill so much as to the following factors: (1) preliminary ileostomy does away with the complications such as abscesses and leakage from the anastomosis which occur in colon surgery; (2) preliminary ileostomy permits the inflammatory part of the process to subside so that the anastomosis is made in a more normal bowel; (3) it makes the limits of error much wider; and (4) it gives the finest results and the lowest mortality.

CONCLUSIONS

1. Preliminary ileostomy or ileostomy performed at the time of resection has given us as good results as the closed method with sulfasuxidine therapy as adjunct. While we use the closed method with sulfasuxidine whenever possible, we feel that it has its limitations in extensive lesions that have perforated or where the adjacent organs such as the kidney, spleen, or several loops of small intestine are involved.

2. For the average surgeon who only occasionally performs a colon resection, it is much safer to do a preliminary or conjunctive ileostomy with his resection. With preliminary ileostomies the patient's stay in the hospital is no longer than in cases of primary resections followed by abscesses or a breakdown of the anastomosis.

3. The preoperative preparation of the patient with glucose, saline, proteins, blood, and careful irrigation of the bowel are just as important as chemotherapy.

4. It is essential to delay operation until the patient is in the best possible condition.

SOMMAIRE

Iléostomie préliminaire ou iléostomie faite au moment de la résection intestinale nous a donné d'aussi bons résultats que la méthode fermée adjointe à thérapie sulfasuxidine.

Quoique nous employions la méthod fermée avec succès chaque fois que c'est possible, nous savons qu'elle a ses limitations dans les lésions étendues qui ont perforé ou quand des organes adjacents tel que le rein, la rate ou des anses intestinales sont envahis par le néoplasme. Pour le chirurgien ordinaire qui ne fait des résections du colon que rarement, il est préférable de faire une iléostomie préliminaire conjoinement avec la résection. Avec l'iléostomie préliminaire, le séjour à l'hôpital n'est pas plus prolongé que dans les cas de résections premières compliquées d'abcès ou de rupture de l'anastomose. La préparation préopératoire du malade à l'aide du serum-artificiel, du glucose, de proteine, peut-être de transfusion sanguine et l'irrigation de l'intestin est aussi importante que la chémothérapie.

Il est essentiel de retarder l'opération jusqu'au moment où le malade est dans les meilleures conditions possibles.

RIASSUNTO

1. L'ileostomia preliminare o l'ileostomia eseguita al momento della resezione hanno condotto—presso a poco—agli stessi risultati della chiusura immediata con il sussidio della terapia sulfasuccidinica. L'A. ritiene che la chiusura dell'intestino debba essere evitata nelle lesioni perforanti, nelle lesioni interessanti parecchie anse intestinali, oppure allorquando queste coinvolgano gli organi vicini, come la milza od il rene.

2. Qualora il chirurgo non abbia una larga esperienza nelle resezioni coliche, e' preferibile ricorrere ad un'ileostomia preliminare o con-

temporanea alla resezione. La degenza dei pazienti non supera quella nei casi sottoposti ad una resezione primario, seguita da ascessi o da una separazione successiva delle anostomosi.

3. Il trattamento pre-operativo con glucosio, soluzioni saline, proteine, sangue, prudente irrigazione dell'intestino, e' altrettanto importante della chemioterapia.

4. E' necessario ritardare l'operazione fino a che i pazienti abbiano raggiunto il massimo miglioramento delle condizioni generali.

SUMARIO

La ileostomia preliminar o practicada al tiempo de la resección intestinal da tan buenos resultados como el metodo cerrado combinado por la terapeutica con la sulfasuccidina. Aunque el último metodo es el preferible sin embargo tiene sus limitaciones en los casos con leciones extensivas que hayan perforado o invadido los organos vecinos, tal como los rinones, el bazo, etc.

Para el cirujano que aun es novicio en la cirujia del colon, la ileostomia preliminar es preferible a la resección primaria.

La terapeutica pre-operatoria es tan importante que la quemoterapeutica y debe de incluir las transfuciones con glucosa salinas, proteicas o de sangre asi como las irrigaciones intestinales que deben de hacerse con cautela.

La cirujia operatoria debe de llevarse a cabo solo cuando el paciente este en buenas condiciones.

A New Operation for Sliding Hernia

ALFRED H. IASON, M.D.
BROOKLYN, NEW YORK

ONE of the most difficult of hernias to repair, because of its peculiar anatomy, is what is commonly known as sliding hernia—*hernie englissade.* Properly it should be referred to as "prolapse of the colon." The hernia does not actually "slide."

In many instances tragic contretemps have been the result of failure to recognize certain cardinal principles underlying the repair of this uncommon variety of hernia which is a trap for the unwary. A clear understanding of the congenital factors involved and the urgency of the problem is absolutely essential. The surgeon often has moments of anxious speculation. Great perspicacity and surgical precision are then demanded of him.

A careful study and survey of the anatomy of sliding hernia and an analysis of the technic utilized in mobilizing the large bowel, be it cecum or sigmoid, are important factors in the surgical procedure designed to correct the hernia in question.

In closing an inguinal defect it is desirable to obliterate as much as possible of the gap without encroaching too closely on the spermatic cord and its component structures, particularly the internal and external spermatic and deferential vessels, the pampiniform plexus and the vas deferens. When a sliding hernia is found, the careless utilization of structures in the surgical field is fraught with dire consequences. In the past many ingenious repairs were suggested, to no avail.

ANATOMY

When a peritoneal investing layer possesses a sessile attachment to the posterior abdominal wall, the enveloped organ is referred to as "retroperitoneal" (vide, the pancreas or retroperitoneal part of the duodenum). However, when the peritoneal attachment is still narrower, the organ is considered to be without a mesentery and partly extraperitoneal. Finally, in examples where an organ is almost completely invested so that the two leaflets of the peritoneal sheath are nearly in contact posteriorly, it is considered possessed of a mesentery.

The cecum and appendix frequently possess a complete peritoneal investment so that they lie free in the right iliac fossa. The usual line of fixation of the ascending colon starts at the beginning of that viscus.

The organs usually found in a "sliding hernia" are either the large intestine (cecum on the right and iliac colon on the left) or the urinary bladder. As a rule the first is found in longstanding oblique hernias, commonly on the right side. Some eminent authorities contend that the highest incidence of this type of hernia is on the right side of the body. When the surgeon is confronted with a longstanding hernia which is not easily or completely reducible presurgically or at operation, and in which a complete repair of the inguinal canal clearly is indicated, he should be acutely aware of the possibility, and ready to cope with, the surprise of a "sliding hernia." Then, too, when the inguinal canal is opened, there is a noticeably large amount of fat surrounding the hernial sac. The sac proper is of increased thickness and there is likewise an increased vascularity of the parts. A presurgical roentgenographic examination, following a barium enema, will reveal the presence of the colon or sigmoid in the hernia sac. Fluoroscopic manipulation is also of value in making the diagnosis.

The bladder, or part of it, not uncommonly is found on the medial side of the neck of large, longstanding, oblique hernias. When there is a distinct thickening of the hernial sac medially, and occasional muscle fibers and large veins are to be seen, the bladder region should be thoroughly palpated with the examining finger in the neck of the sac. Urinary bladder hernias are always found closer to the medial abdominal line than other varieties. Usually it is a complication or an integral part of an inguinal hernia.

Classification. There are four varieties of prolapse of the colon:

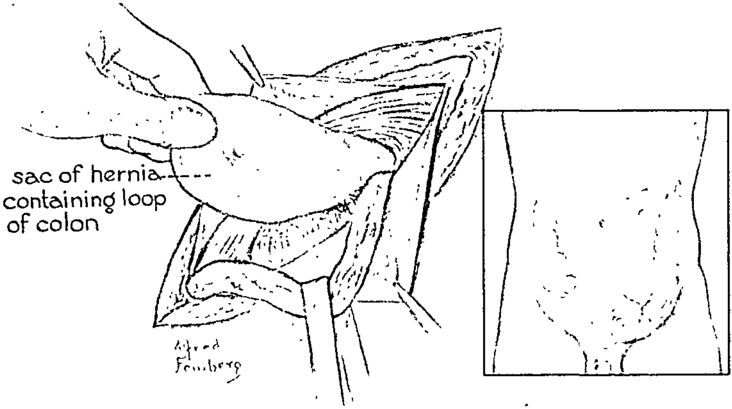

Fig. 1. Sliding hernia, left side.

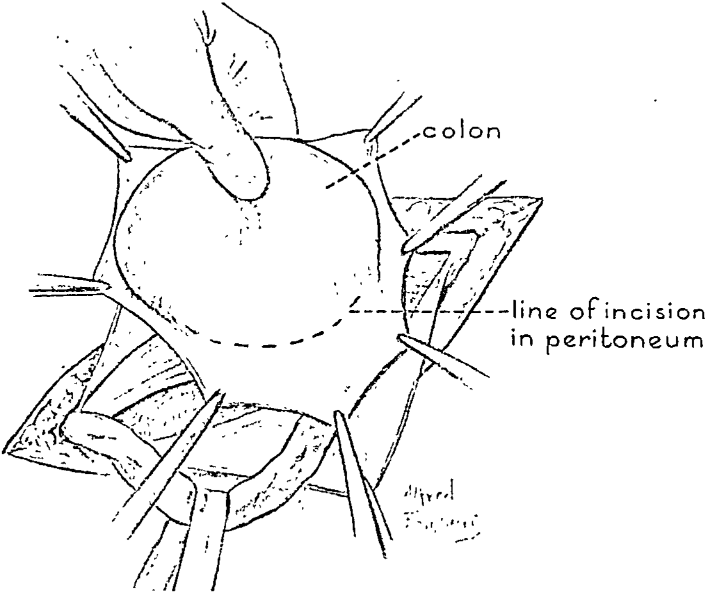

Fig. 2. Visualization of anatomy after opening sac. Note line of incision.

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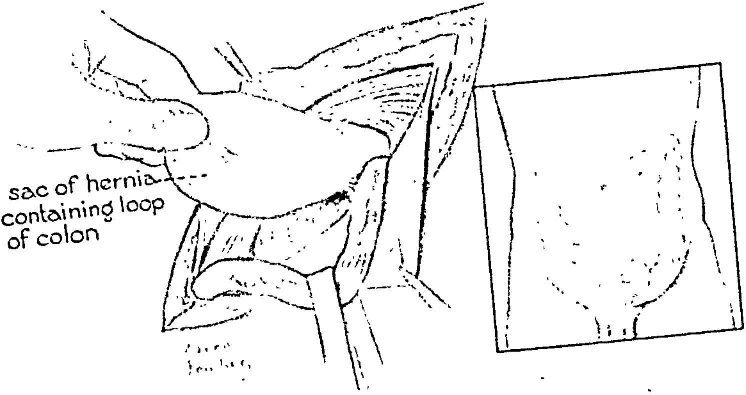

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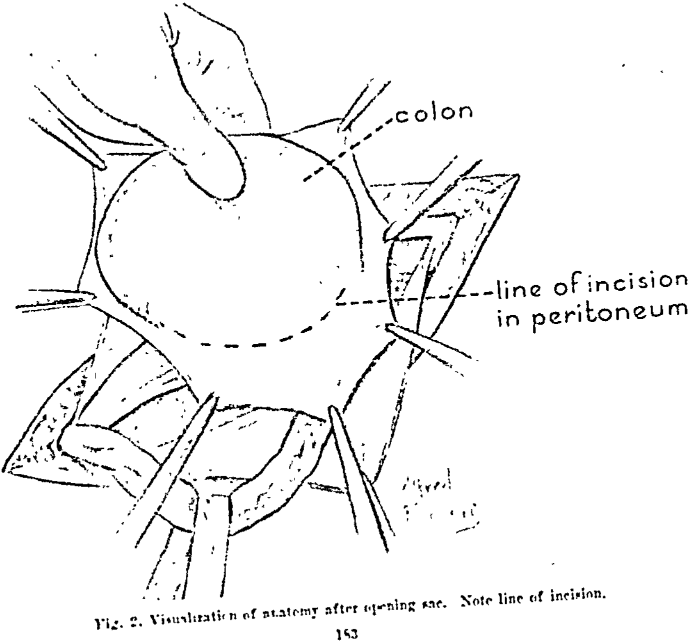

Fig. 2. Visualization of anatomy after opening sac. Note line of incision.

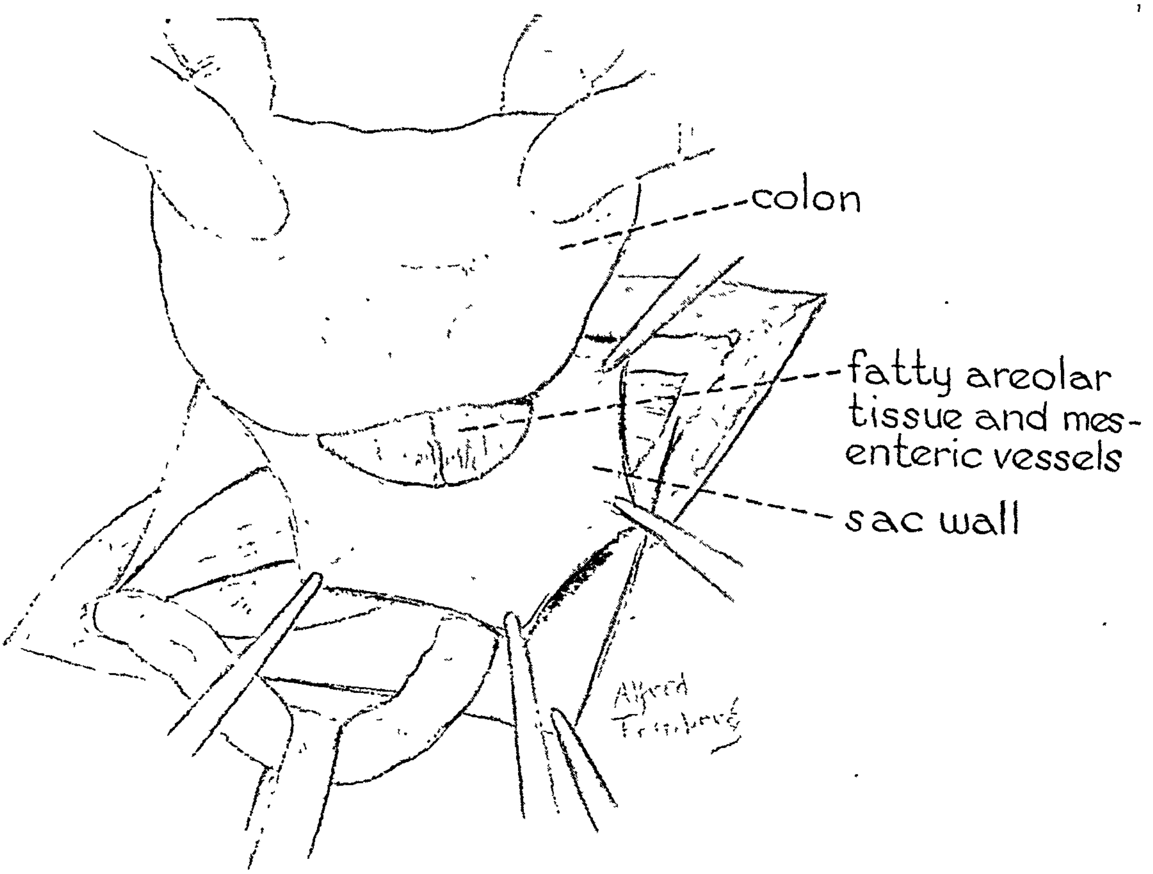

Fig. 3. Release of colon in the manner of a fiıst stage Mikulicz procedure without severing mésenteric vessels.

1. Mobile cecum lying low in the pelvis with a relaxed mesentery, and very loose retrocecal and retroperitoneal areolar tissues.

2. Mobile cecum presenting the same pathology as (1), but the cecum and even the appendix enter a preformed open funicular process of peritoneum in the inguinal canal.

These two classes are present where there is a definite mesentery.

3. A cecum that has a broad attachment resembling mesentery may prolapse sufficiently to appear at the deep inguinal ring. The sac is incomplete posteriorly over the unattached area of bowel. This variety occurs in a cecum with a broad mesentery and eventually may become similar to the next class.

4. When the prolapse is complete, no real sac is present and there is no mesentery, the cecum being almost completely extraperitoneal with its serous peritoneal covering intact—[illegible] at the deep inguinal ring. The bowel may readily be mistaken for a hernial sac and inadvertently opened.

In the repair of sliding hernia attention must be given particularly to Classes 3 and 4.

In Class 2, no more difficulty is experienced than in the usual hernia operation.

In the third form there is a deficiency in the sac posterolateral to the cecal wall, which presents. There are two hazards in attempting to ligate the sac high up. One is an accidental puncture of the cecal wall, and the other—and more common—is the danger of encroaching on the posterolateral aspect of the cecum, and of ligating the cecal vessels.

In the fourth variety, an additional hazard is the failure to recognize a cecal bulge as cecum, under the impression that the sac is presenting, thus incising or plicating the gut with the dire possibility of gangrene.

It should be emphasized that the bowel involved on the left side is almost always *iliac*

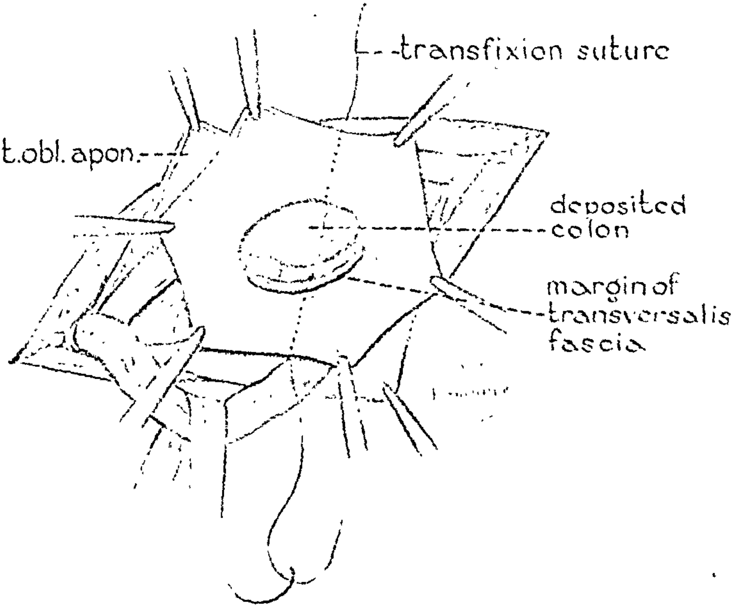

Fig. 4. Transfixion suture inserted as described in text. Note colon deposited into peritoneal cavity.

colon, and *not* sigmoid colon (which possesses a mesentery and would descend into the sac and not behind it), as is often stated.

SURGERY

In the past the hernial sac was transfixed distal to the intestine in order to obviate injury to the subjacent attached bowel. Thus, only a small segment of the sac was removed. When it was found that a certain part of the sac did not slip back easily it was widely and circumspectly opened. Resistant adhesions usually thickened the sac wall and the bowel remained anchored in the sac cavity (Fig. 1).

In Figure 2 it is obvious that there is no real mesentery on the inferolateral aspect of the bowel. The visceral peritoneum is continuous with the lower sac wall forming a sessile continuation. The condition is due to the fact that this variety of hernia, in reality, is purely a "prolapse."

When the sac and its contents have been completely freed up to the deep inguinal ring the separation of the bowel, so far as possible, is continued into the iliac fossa. The peritoneum is also separated in part, and the bowel and peritoneum are drawn into the wound. The sac is now opened widely, being careful to avoid injury to the contained viscera.

If the colon can be liberated by incising the visceral peritoneum at the angle where it becomes continuous with the peritoneum forming the sac the bowel can be mobilized freely as is done in the first stage of a Mikulicz procedure. Care must be taken to avoid injury to the subjacent mesenteric vessels which are present in the areolar and fatty tissue between the two layers of mesentery. The colon is then

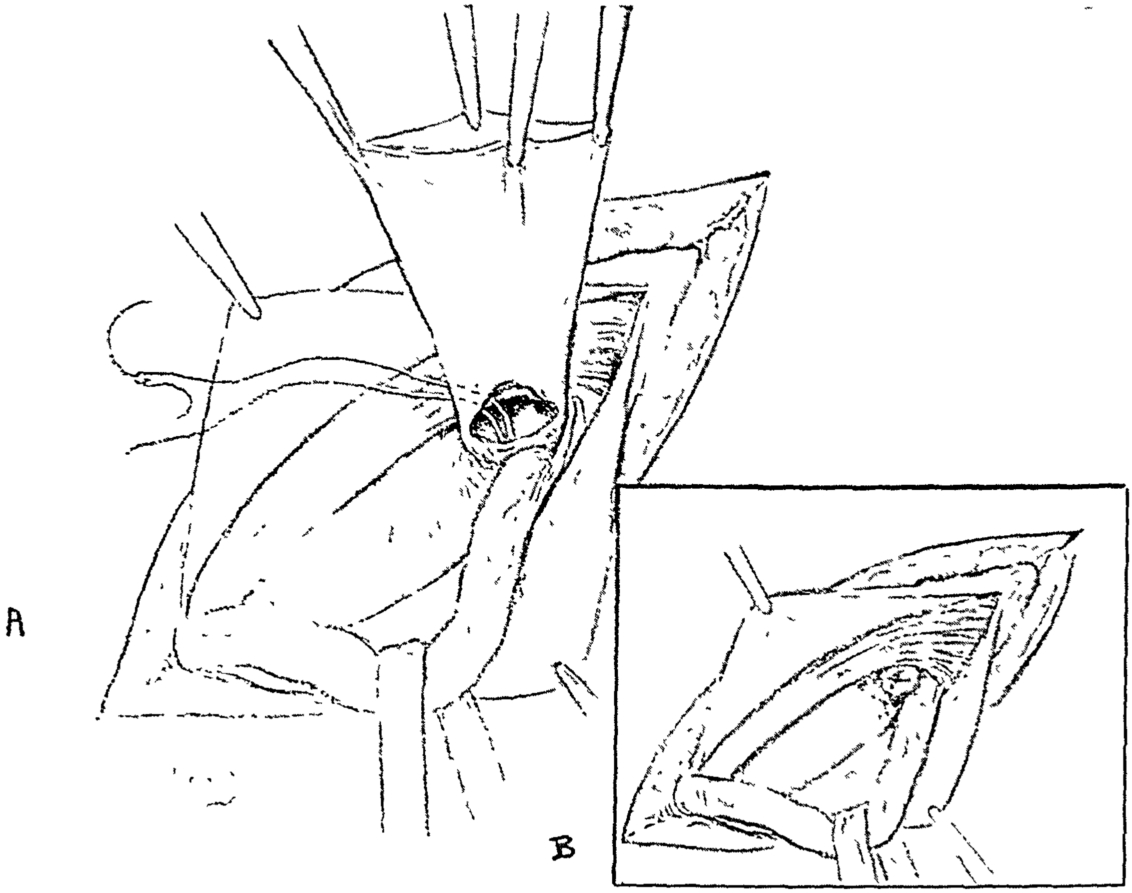

Fig 5 A. Another view of transfixion suture. B. Stump after resection of redundant portion of sac.

easily placed within the peritoneal cavity (Fig 3).

The neck of the sac is then clearly visualized There is some deficiency of peritoneum at its inferior margin where it is in contact with the adjacent transversalis fascia. But these structures are attached to each other by firm synechiae. This small aperitoneal angle may therefore be treated as one structure. The neck of the sac is then transfixed (Figs. 3, 4, 5 and the redundant part removed.

A standard technic is then utilized to complete the operation, preferably a modified Wyllys Andrews hernioplasty. In a few patients with "sliding hernia," in addition to the operation described, I have removed the spermatic cord structures in order to close the inguinal canal completely.

This operation has been performed in 12 [illegible] with excellent results; in ten, the pelvic colon was discovered and in two, the cecum.

To date there has been no wholly satisfactory surgical procedure for "sliding hernia." In my experience recurrences have been frequent. Because of the danger of encroachment on the blood supply, a satisfactory repair is difficult. The new procedure described has been found adequate.

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A Massive-Resection Operation for Varicosities of the Leg Without Massive Sclerosing Therapy

N. GARBER, CH.B. (RAND), F.R.C.S. (EDIN.)
JOHANNESBURG, S. AFRICA

THE subject of leg varicosities is an evergreen one. The spate of publications issued during the war years and emanating from various countries bears eloquent testimony to the prevalence of this disorder, the disability it engenders, and its refractoriness to treatment.

Excluding the use of crepe bandages and elastic stockings, popular interest has for long favored the intravenous injection of sclerosing agents as the treatment par excellence of varicosities, operation with sclerosing fluid as an adjunct being only slightly less privileged.

The operation[1,2] about to be described is a natural development of my increasing aversion to sclerosing agents. Since it is executed under local anesthesia, the elderly, in whom varicosities are numerous and pronounced and of which dermatitis and ulceration are common features, are not debarred from its benefits. It entails the following:

1. The high-resection operation.
2. Division, between fine silk ligatures, of the great saphenous, its multiples and large tributaries, at intervals of 1 inch (in the thigh) or even ½ inch (in the calf) from the midthigh to the region of the ankle. No sclerosant of any sort is used.
3. Disconnection of the small saphenous from the popliteal vein, and subdivision of the former as in the great saphenous.

The operation lasts from 1½ to 2½ hours in each leg, depending upon the size, number and accessibility of the veins (presence or absence of obesity), and whether the vessels are intimately adherent to the overlying skin as a result of mild but persistent chronic cellulitis, consequent upon many years of venous stagnation and low grade bacterial infection. In 300 limbs, from 15 to 30 incisions were employed. Incisions in the thigh vary from ¾ inch to 1 inch, depending upon the thickness of subcutaneous fat overlying the veins; in the calf they vary from ½ inch to 1¼ inch in length. They are placed transversely across the veins. Despite the long duration of the operative procedure, all patients could walk in the immediate postoperative period. In the past an interval of two days was permitted to elapse between operations on both legs. Recently, however, the interval was extended to several weeks or months in the case of large varicosities, so as to facilitate convalescence and prevent pulmonary embolism. Recognition is herewith given Marshall[3] who independently evolved the same operative procedure.

Among the indications for the operation may be the following:

1. Recurrence of varicosity after popular operations.
2. The ever-present fear that deep phlebitis and pulmonary embolism would follow the use of sclerosing agents.
3. The lingering pain after instillation of such agents.
4. The hope that convalescence would be promoted and shortened since postoperative inflammatory phenomena would be minimal in the absence of sclerosing therapy.

OPERATIVE AIDS

The following principles were found to be of value:

1. Careful preparation of the skin of both limbs (not only the limb scheduled for operation) from umbilicus to toes.
2. The surface marking of the great and small saphenous veins.[4]
3. Two assistants and four retractors.
4. The use of procaine 0.5 per cent solution without adrenalin as a local anesthetic. Of this solution, 5 to 100 cc. are employed in the groin and 2 to 15 cc. at each of the distal sites of division, depending upon the amount

of subcutaneous fat present. Eighteen ounces of this solution were employed in one particular case without signs of toxicity.

5. Fine silk (00) as ligature material for the great saphenous or its tributaries.

6. The Trendelenburg position during operation so as to facilitate venous return, obviate stasis and effect marked diminution in the size of gross varicosities (from contraction of muscle fibers in the venous wall) so that these can be approached through tiny incisions.

7. Encouraging the patient to move his toes and ankles every 15 minutes during the operation. Venous return is thereby accelerated.

8. The introduction of liberal amounts of sterile sulfonamide crystals into each little wound made through skin the subject of chronic dermatitis.

POSTOPERATIVE MANAGEMENT

A small neat mercurochrome dressing is applied to the groin and kept in position by a figure-of-eight of elastoplast, while the remainder of the limb is swathed in a mercurochrome dressing, maintained by a large crepe bandage firmly applied. The patient walks on return to the ward, and thereafter for five minutes in each hour until [illegible]30 p.m. that night. Walking is repeated the following day, for five minutes each hour. Thereafter bed rest is encouraged. From the moment the patient is returned to the ward, regular movements of toes, ankles and knees are enjoined to be executed through the day, especially during the period of bed rest. In patients exhibiting chronic dermatitis or ulcer formation, 30,000 units of penicillin are injected intramuscularly every three hours until 10 doses have been given. Sutures are removed on the eighth to the tenth day. Bandages are worn for two weeks to a month after operation in order to encourage dispersal of edema.

RESULTS

In the three years ending [illegible] February, 1947, [illegible] operations were performed.

Mortality. One death [illegible] in a healthy [illegible] of 42 years, from [illegible] complication [illegible] ileus of [illegible] origin. Ab[illegible] ploration re[illegible] abnormal. Despite intestinal suction, intravenous fluids and injections of penicillin, exitus occurred. Two patients with similar illnesses were encountered within a short period, one with and the other without varicosities.

Recovery. Convalescence was short. Most patients remained in the nursing home for only one day; some for two or three days; several (ulcer cases) for four days.

Postoperative pain was negligible in comparison with that experienced after sclerosing therapy.

Complications. Pulmonary embolism developed as a complication in one patient who had been subjected to two leg operations within three days. Embolism followed phlebothrombosis initiated by two factors: (1) the nonuse of the Trendelenburg position during operation; (2) the excess of coagulant substances liberated into the blood stream from the sites of operation.

Recovery followed bilateral femoral vein ligation. Dual limbs were thereafter subjected to operation at more protracted intervals.

Recurrence was manifest in four patients; in one, a varicose channel above midthigh made its appearance two years after operation (originating in the uncommon perforator described by Sherman); in another patient, a large tributary entering the saphenous immediately proximal to the knee was involved, while in a third patient a tributary below the knee showed itself. In the fourth patient the saphenous below the knee recanalized, but was satisfactorily obliterated by divisions at 1-inch intervals. In these four patients recurrence is attributed to segments of 2 inches to 2½ inches being constructed instead of shorter segments. In two other patients, accessory perforators (totally unrelated to the great saphenous and *previously* competent) became varicose and manifest. All these tributaries were satisfactorily dealt with by subdivision into silk-tied segments. Recurrences developed behind the knee *in three patients* with small saphenous varicosity, the complication undoubtedly resulting from inaccurate disconnection of small saphenous from the popliteal vein, so that a short stump of saphenous, instead of no stump, *remained.*

Observations. Most ulcers were healed by the tenth day, some after a further week (especially when ulcer craters were filled with sterile sulfonamide crystals at the time of operation), and one after a month. In no case was ulcer excision or skin grafting employed, yet no ulcer failed to heal. All remained healed. Only in one case did subcutaneous abscesses occur. This was a patient with previous chronic dermatitis, in whom neither instillation of sterile crystals nor penicillin was used.

Limbs the seat of extensive chronic dermatitis, when observed after a period of two years, presented the appearance of healthy elastic skin.

Edema and swelling disappeared completely in all cases by the time a month had elapsed, exceptions being cases of very extensive dermatitis which required a further month. One case of phlebothrombosis with nonfatal pulmonary embolism occurred in a patient subjected to bilateral ligature of the femoral vein and required eight months. Even where extensive chronic dermatitis existed before operation, the limb subsequently was restored to its pristine shape. Fat legs became slim.

Some patients were at work within 24 hours after operation, some after a week, others after a month.

The scars of the smaller incisions are not discernible after three weeks. Male patients have never remarked upon the matter. Women in the fourth, fifth and sixth decades (the bulk of sufferers from varicose veins) have been too pleased to be rid of their pestilence to comment, even when 1-inch incisions became necessary to deal with very large and adherent veins or leashes of vessels. Even young women (possessed of otherwise shapely lower limbs) have expressed their pleasure at the disappearance of their tormenting varices, and have been content with the moderate length of their scars, for seldom are incisions exceeding 1/4 inch in length necessary below the knee in such patients.

COMMENT

It is my belief, and experience lends substantiation to that belief, that when the great saphenous is subdivided into segments 3/4 inch to 1 inch long, and tied at both ends by fine silk, the influence of all perforators, actual or potential (channels concatenating the great and small saphenous to the deep veins), becomes nullified as the T-shaped fragments rapidly thrombose and cicatrize. Not only is the operation effective in the thigh, but it is preeminently suited for obliteration of the numerous perforators in the calf. Several patients beyond the age of 70 were subjected to 4-hour operations, yet made smooth and easy recoveries. All were astounded at the moderate postoperative pain, and the early relief from ulcer distress.

The attention bestowed upon the great and small saphenous veins should likewise be conscientiously devoted to isolated varicose perforators (gluteal, calf and popliteal) and to the accessory varicose perforators of Sherman[4] (vessels draining the skin and passing directly to the femoral vein, but avoiding the great saphenous).

Certain authors[5] believe that no one method should be employed in the cure of varicosity. They utilize venous competency tests to correlate operative measures with the degree of varicose transformation in veins. The present writer disapproves of this policy, for the varicose change is a progressive one, especially in young and middle-aged patients, and since there is available a tried and proved remedy that can be utilized with local anesthesia, the writer contends that it should be employed in as many cases as possible, more especially since there is an increasing volume of opinion[4, 6, 7, 8] that clinical tests for venous competency are not regularly effective in the grading of varicosities.

SUMMARY

Most of the present-day methods employed in the treatment of varicosity are considered to be undesirable, since their efficacy is dependent upon the use of sclerosing agents. Apart from the facility of execution, sclerosing injections have nothing to recommend them, for not only do they fail to cure, but they expose the patient to loss of life or limb, prolonged morbidity or expense. Similar penalties beset operation coupled with the use of sclerosing substances. Recurrence is only too frequent a sequel of such injections or operations. In the multiple-resection operation a surgical procedure is envisioned which

is not difficult of accomplishment by the trained surgeon, is free of hazards associated with sclerosing agents, and which, above all, extends the promise of permanent cure in young or old, without the added burden of pain or prolonged disablement.

SOMMAIRE

Quand la grande viene saphène est divisée en segments de $\frac{3}{4}$ a $\frac{1}{4}$ de pouce et ligaturée à chaque bout par une soie fine, l'influence de tous les perforations actuelles ou potentielles est annules. les segments se thrombosent et se cicatrisent.

Non seulement l'opération est efficace dans les cas intéressants la cuisse mais aussi donne des résultats très satisfaisants pour l'obliteration de nombreux perforateurs dans la jambe. De nos jours il y a facilité d'exécution. Les injections sclérosantes n'ont rien qui les commandent non seulement vue qu'elles ne guérissent pas mais aussi parce qu'elles exposent le malade à la perte de vie. mais ou bien à la perte des membres ou a une morbidité prolongée. et à des dépenses.

Les mêmes désavantages accompagnent les opérations associées à l'emploi de substances sclérosantes. Les récidives ne sont que trop fréquentes après telle injection et telle opération. Dans l'opération. les difficultés ne sont pas grandes. nous ne recontrons pas les hazards qui accompagnent l'emploi d'agents sclerosants. elle nous permet d'envisager une cure pour les jeunes ou pour les vieux. sans leur ajouter l'inconvénient de la douleur ou de l'invalidisme.

RIASSUNTO

Allorquando la vena safena magna viene suddivisa in sezioni (lunghe da 2 a $2\frac{1}{2}$ centimetri) legate alle estremita' do fili di seta. l'influenza delle vene perforanti diventa nulla. in quanto le sezioni della vena si trombizzano rapidamente. L'operazione offre risultati eccellenti non solo a livello della coscio, ma e' specialmente adatta per l'obliterazione delle numerose vene perforanti del polpaccio.

La massima parte degli altri metodi per il trattamento delle vene varicose offrono il fianco alla critica, perche' dipendono dall'uso di sostanze sclerosanti. Queste falliscono non solo al loro scopo, ma espongono i pazienti ad una lunga morbilita', a grandi spese, alla perdita eventuale delle gambe a talvolta della vita.

La resezione multipla delle vene—che non e' difficile per un chirurgo bene allenato—e' invece priva di pericoli, mentre offre tanto ai giovani, quanto ai vecchi la promessa di una cura definitiva.

SUMARIO

La division de la vena safena interna an segmentos de 2 a $2\frac{1}{2}$ cms. de largo y la ligadura con seda fina de los extremidades de estos segmentos produce su cicatrización completa y por lo tanto la eliminación de las ramas colaterales que son en general la causa de las recidivas.

La mayoria de los metodos de tratamiento de las varicosidades de la pierna no son satisfactorios por cuanto dependen del uso de substancias esclerosantes vue producen frecuentes recidivas. En cambio el metodo sugerido re resección multiple con segmentación de la safena interna y de sus colaterales cuando se practica con cuidado da exelentes resultados y esta libre delos peligros que acompanan el uso de los agentes esclerosantes.

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Results with Medullary Nailing of Fractures of the Femur*

ENDRE HEDRI, M.D., F.I.C.S.**
BUDAPEST, HUNGARY

MEDULLARY nailing, first described by Küntscher in 1939, has given the impetus to a sweeping change in the treatment of fractures. The operation proved to be such a daring one that for a time it amazed most contemporary surgeons, including myself. In some quarters the reaction was one of sharp opposition. Küntscher's idea originated from the nailing of the neck of the femur. The operation became quite commonplace, and so far has been employed in 184 cases in our clinic with complete success

The basic idea is to drive a long metal nail into the medullary space of the fractured bone. The nail should be long and thick, but slightly less in size than the medullary space itself. The purpose of the nail is to serve as an inside splint, so that the ends of the fragment can be perfectly approximated and assured against displacement. The nail itself is made of noncorrosive V_2A steel, double-plated, V-shaped in cross section.

In the first description of the operation the approximation of the fractured ends is carried out under x-ray control. As soon as this is completed, a hole is bored in the medullary space, following an incision, at a spot at a distance from the fracture, preferably just below the trochanter major, if the femur is broken, or beside the tuberositas tibiae, if the fracture is on the tibia. Through the hole a thin metal wire 200 to 300 mm. long, is slid into the medullary space, and then the steel nail itself is driven along this guide wire. The nail is thrust into the medullary space of the distal fragment to a depth of not more more than 60 to 80 mm. The nail should be removed after 3 months.

Today the technic is quite different. At first glance it seems to be a barbaric technic that defies the laws of biology. Theoretically, a foreign body driven into the medullary space should prove a risky and dangerous procedure. But theory has again been disproved by practice.

Pathologically, the following points must be considered:

1. The effect caused and the part played by a foreign body in a closed medullary space, from the standpoint of sequestration, and the development of callus.
2. Fat embolism as a result of medullary destruction.
3. Effect of the operation on the marrow as a blood forming organ.
4. Possibility and consequences of an infection.

Judging from cases on record, no sequestration, and no fistulae will be developed if there was no infection. Undisturbed and smooth development of callus has been proved by animal experiments, and by surgical results in 82 cases. X-ray control films demonstrate that ossification of the ends of the fragments is perfect.

Concerning the danger of fat embolism, in our opinion, the fracture itself, by its violence, causes worse medullary destruction than does this method of nailing. None of the 82 patients in our practice died of fat embolism.

The effect of the operation on the marrow as a blood generating organ, was of particular interest both from the pathologic and clinical point of view. As an approach to the problem we studied the qualitative and quantitative blood count of patients undergoing the medullary nailing operation. Blood counts were made once prior to the operation, and then every five to six days following it, and finally some time between three and six months after the operation. Summing up the results of these counts, we found that the red blood cells increased up to between 10 and 30 per cent following the nailing operation, with a corresponding rise in hemoglobin In every case there was a striking reaction on the part of the thrombocytes and the reticulocytes, both increasing up to 50 per cent in many of the cases. There was hardly any noticeable change in the leukocyte count. The qualitative blood count showed juvenile forms, with a lively increase of the eosinophile cells, in some cases comprising as much as 8 to 10 per cent. There is some ground for the assumption, therefore, that medullary nailing is apt to stimulate the blood generating activity of the marrow.

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** Professor of Surgery, University of Budapest.

Complications. The most serious complication is an eventual infection. Suppuration occurred in 4 of our 82 cases, or 6 per cent. One case was fatal. All these cases with suppuration were old compound fractures with osteomyelitis and malunion, or cases healed with a false joint. These suppurating cases defied our precaution of waiting six to twelve months before carrying out the nailing operation on account of a latent infection. The 4 cases occurred at a time when prophylactic penicillin treatment was not yet available. Since we now administer penicillin prophylactically, and also use penicillin after the operation, no further cases of suppuration have occurred. It may be expected that with prophylactic penicillin treatment latent infections can be prevented from flaring up.

Indications In 1943 we abandoned Küntscher's method of "closed nailing" as described above, replacing it by an open procedure Open nailing has been adopted since old fractures, such as badly consolidated fractures and pseudoarthrosis, always had to be laid open It was applied to new fractures calling for a nailing operation, since the nailing itself is a great deal less difficult to carry out technically once the fracture line is laid open In recent years we decided to restrict the indication for medullary nailing because the operation seemed to have been used much too frequently in our country as well as abroad, to justify every consideration Now it is no longer used if a fracture of the upper extremity is to be dealt with, in which case we prefer to resort to graft or wire suture. [illegible] combining the two methods. [illegible] nailing, as a rule, will be used very [illegible] of a fresh fracture of the [illegible] A badly consolidated fracture of the tibia, or one healed with a false joint is, however, considered to offer a great deal more chance for the successful use of the nailing operation.

Indications for medullary nailing are: (1) the badly consolidated fractures of the femur; (2) those healed with a false joint; and (3) such new fractures of the femur which cannot be successfully dealt with by conservative means; and (4) where open reduction with internal fixation is indicated. Cases falling within these categories can be more successfully treated by medullary nailing than by the use of grafts, or the Lane-Lambotte method, or any other form of metal splint or wire stitching.

Technic. As a rule we use spinal (lumbar) anesthesia for medullary nailing of the femur. The patient is placed upon his sound side. Starting with the incision we expose the fracture site. If badly consolidated fractures must be dealt with, the fracture ends must be cut apart, sawing off as much of each as appears to be required to permit proper approximation. Any false joint must be properly excised. As soon as this is done the guide wire is slid into the medullary space of the proximal end, forcing it through the bone distal to the greater trochanter. The wire should reappear on a corresponding site on the skin. The nail, selected as to appropriate length and breadth, is then slid along the guide wire until it penetrates the distal fragment up to 60 to 80 mm. As a rule the nail itself is removed after one year.

We seldom use plaster cast around the pelvis to fix the fracture following the operation, preferring instead a plain plaster splint. The immobilizing splint is removed after four weeks and the patient is permitted to start walking immediately with crutches or specially designed canes.

SUMMARY

Medullary nailing contributed a great deal to the improvement of fracture treatment. It has been established, however, that medullary nailing can seriously affect the organism and *therefore* should never be resorted to unless a careful examination indicates that it is indicated In our opinion this operation should be confined mainly to cases of fractures of

the femur, an exception being certain fractures of the tibia, in which it has proved to be an excellent and indispensable method.

SOMMAIRE

L'emploi de clous intéressant la moelle osseuse a contribué à améliorer le traitement des fractures. Il a été établi néamoins que cette méthode peut affecter l'organisme très sérieusement, et ne doit être employée qu'après un examen très approfondi. Dans notre opinion cette opération ne devrait être confinée aux cas de fracture du fémur et dans les exceptions très rares de fracture du tibia où elle est souvent une méthode excellente.

RIASSUNTO

La transfissione midollare delle ossa ha indubbiamente contribuito a migliorare i risultati delle fratture Poiche' questo procedimento puo' coinvolgere delle gravi conseguenze per l'organismo, e' bene limitarlo ai casi in cui un esame accurato dimostra che e' utile, se non indispensabile. L'A. ritiene che vada limitato alle fratture del femore ed a talune fratture della tibia, nelle quali ha condotto a risultati eccellenti.

SUMARIO

El tratamiento de ciertas fracturas por la aguja intramedular es una contribución de mayor importancia. Sin embargo por los peligros que acarrea este tratamiento solo se debe de usar cuando hayan verdaderas indicaciones. En nuestra opinion esta operación esta indicado solamente en las fracturas del femur y en ciertas fracturas de la tibia, en las cuales ha probado ser un metodo excelente.

Intravenous Solutions: Facts and Fancies

LEE RADEMAKER, M.D., F.A.C.S., F.I.C.S.*
SALISBURY, MARYLAND

MUCH has been written concerning post-infusion reactions since our early pioneer work in 1930, in which we corroborated the earlier but well hidden articles of Florence Seibert and further established ways and means of eliminating these reactions. Seibert's work, published in the *American Journal of Physiology,* had not attracted attention, and when we began our work we started from an entirely different method of attack.

Despite all that has appeared in the literature since that time, many false ideas still exist in the mind of clinicians, and since reactions still appear, even in the best clinics and hospitals, many of the facts originally proved have been set aside or forgotten, and many new, fallacious ideas have been propounded and old theories revived. It is with this thought in mind that this paper is presented to review the facts concerning the use of intravenous solutions, to explain the occasional reactions that take place today, and to offer methods to eliminate even these.

In 1930 we published a report covering our investigation as to the cause of reactions. In this report we discussed hydrogen ion concentration and our finding that reactive solutions had a pH of 8 or over. We showed further that by adding small quantities of ammonia or acetic acid we could vary the hydrogen ion concentration of the solution but not change the reactive property. Thus a solution with pH of 8, which produces a reaction, could be adjusted to a pH of 6 yet still produce the reaction; conversely, a non-reactive solution with a pH of 6 could be adjusted to a pH of 8 yet not cause a reaction.

Thus we came to the conclusion that some alkaline compound was the cause of reactions. By careful chemical methods this was shown to be a nitrogen-containing organic compound. At this stage of our investigation we discovered Seibert's articles and carefully corroborated her work.

Seibert showed by animal experimentation that the compounds we had discovered were the product of bacterial growth in distilled water standing in laboratories for long periods of time. She named these compounds "pyrogens" and the organisms "pyrogenic bacteria." She identified these bacteria as bacilli belonging to Jordan's Group X1. Usually these bacteria are found in river water. Our own investigation disclosed them in varying numbers in tap water in numerous cities. Their number vary with the seasons, being most numerous during the summer since their optimum growth temperature is from 78° to 82° F.

Since this work of Seibert other bacteria have been shown capable of producing pyrogens. Thus Co Tui has demonstrated a number of varieties of both pathogenic and nonpathogenic organisms to be capable of producing pyrogens. None, however, seems so powerful along this line as those originally named by Seibert and now included in a family Bacteriaceae of the genus Achromobacter.

Banks in 1934 reported that *Pseudomonas ureae* and *scissa* were pyrogenic. Co Tui stressed the importance of the fact that *Proteus* vulgaris and *Bacillus subtilis* are pyrogen producers, since these organisms are *frequent air contaminants.* Such contaminants suggest a source of pyrogen-producing organisms other than tap water. Yet in all the studies made by Seibert, these organisms did not appear in distilled water which had been allowed to stand. The problem of growth of organisms in solutions and distilled water is different from the problem of growing organisms on agar or other media and then testing those organisms for pyrogenic reaction, as was done by Co Tui. It is quite probable that the above named air contaminants will not grow in distilled water. At least, in our experience they have not been a factor in pyrogen production in solutions and the original organisms described by Seibert have been the organisms concerned.

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* Diplomate American Board of Surgery.

It is their products, not the bacteria themselves, that cause reactions. Seibert filtered out bacteria from solutions by Berkefeld filters and showed that the solutions still produced temperature reactions. She did not establish the rate of growth but personal observations during the past few years have demonstrated that pyrogen can be developed within two hours at room temperature.

As a result of these investigations we came to the definite conclusion that ordinary tap water is the cause and source of contaminants for solutions, glassware, tubing, etc. More recent work has shown that films of moisture, as seen after washing glassware or rinsing rubber tubing can easily develop pyrogens sufficient to produce reactions; indeed a sufficient amount of pyrogen can be formed within an intravenous needle rinsed in tap water to produce a reaction.

One other characteristic of pyrogen which has received little attention is its extreme solubility. Thus pyrogen dried in a film on glassware or tubing is readily dissolved and removed by any aqueous solution in momentary contact with it. This accounts for the ease of reaction reduction when even small amounts of pyrogen-free solutions are run through contaminated tubing or needles. This property, however, also gives us an added safeguard. If 50 to 100 cc. of pyrogen-free solution are run through the intravenous set and needle and wasted, before the needle is inserted into the vein, one can almost completely eliminate danger from contaminated tubing and needles.

With this review of earlier work done, we shall now review each of the possible sources of reactions as we find them today.

SOLUTIONS

The suggested methods of our earlier work, distillation with baffle plates and deconcentrator tubes, or triple distillation to prevent pyrogen being carried over in spray, has been widely applied by hospitals and commercial manufacturers. Our warnings as to the cleansing of glassware and immediate sterilization have also been followed closely. In fact, before the war this was so strictly carried out that most commercial houses used only new glassware. During the war with its attendant shortage of glass a method of cleansing and sterilizing immediately with live steam was introduced which carries out our theory equally well, and has proved eminently satisfactory.

Our crude method of pyrogen analysis by permanganate which often proved in error, has been replaced by the more accurate, biologic assay method of injecting samples into rabbit veins and checking any rise in temperature or leukocyte count. This assay and the above methods have made all commercial solutions pyrogen-free except for one possibility. When each day's distillations is begun I have advised that the first fraction of distillate be discarded. If this is not done there is a possibility that the first pint or quart distilled may be contaminated by overnight accumulation of pyrogen in the apparatus itself. Since only certain samples of each lot are biologically assayed this contaminated quantity may be missed. Most manufacturers, however, either use the apparatus continually or follow this advice. This may explain the occasional reaction for which no other explanation is possible.

Thus we can say that commercial preparations in general are completely pyrogen-free. The same is not true of solutions made in hospitals. Many old-fashioned distilling apparatuses are still to be found in laboratories or supply rooms to which the manufacture of solutions is entrusted. The only idea we can express here is the wonder that infusions are not attended by more pyrogenic reactions under these circumstances.

Other technics for preparing pyrogen-free solutions have been advanced during the past 10 years. The adsorptive technic of Co Tui and his co-workers is the chief among these. Co Tui, using an adsorptive filter of asbestos, successfully prepared pyrogen-free solutions. The method is slow, and not very adaptable to large scale production, so that it has not found widespread use. Occasionally an article appears in which prolonged boiling with retort for more than two hours is recommended to destroy pyrogens, although simple autoclaving will not, yet this method is never as sure as proper distillation and is cumbersome for large scale use. The very small hospital may find it advantageous, yet the economical price of available commercial preparations precludes the use of this method.

Thus proper preparation into pyrogen-free glassware and immediate sterilization still are the criteria in the production of pyrogen-free solutions.

One other important point which we stressed in our earlier work which has been carefully followed by commercial houses but is often a source of grief to hospitals, is the interval cleansing of distilling apparatus. Where the biologic assay method is used the necessity for cleansing the apparatus is readily detected; when not used, as in hospitals preparing their own solutions, the first warning may be a number of reactions. Cleansing at regular intervals depending on the amount of use, type of apparatus and degree of contamination, would prevent these reactions where it is inconvenient or impossible to do biologic assays.

CHEMICALS

Co Tui has called attention to the fact that the chemicals, glucose, sodium chloride, etc., used in the manufacture of intravenous solutions may not be free of pyrogens, regardless of their degree of ordinary chemical purity. It is conceivable that such contamination may exist, since these chemicals are dissolved, then evaporated. If it does exist, then only the method of Co Tui can successfully eradicate all pyrogens from solutions. However, in thousands of liters of solutions manufactured from C. P. glucose and salt at the University of Pennsylvania we never had a reaction traceable to these chemicals. Nor has this been found to be a factor in the commercial manufacture of solutions, so that we have come to the conclusion that good chemically pure drugs are free of pyrogens. Special manufacture of the chemicals with pyrogen-free distilled water may be a solution to this problem, but actually noncontamination should be the answer. Co Tui has shown that in the manufacture of sera, this factor can be an important one, and should be so regarded, using pyrogen-free distilled water in all stages of manufacture.

TUBING

We attempted (1930) to explode the myth that rubber tubing could be the source of reactions by careful and painstaking investigation. This myth has again returned to the extent that many types of rubber tubing are offered for intravenous use, each manufacturer claiming his to be reaction proof. Our work proved that rubber tubing, per se, no matter what type or make, could not produce reactions. We have, however, already called attention to the frequent contamination of rubber tubing with tap water. Enough pyrogen can be produced to cause reaction, no matter what type or make of tubing is used. Thus, rinsing out tubing, allowing it to lie, even to dry, before sterilization, has caused many a reaction blamed upon rubber tubing itself. With the shortage of trained hospital help, intravenous sets are often done up and prepared in a haphazard manner. Tubing is often rinsed in tap water, allowed to dry, then placed in sets and autoclaved at the convenience of nurse or technician.

When one considers that an intravenous needle containing tap water film can grow enough pyrogen in two hours to produce a reaction, one can easily see that the above preparation of tubing may cause many and severe reactions. Many hospitals will claim that this is not true, but one must remember that the concentration of pyrogen depends on water source, and also varies with seasons of the year.

Because of the meticulous care necessary to prevent reactions from contaminated tubing many suggestions as to care of rubber tubing have arisen, the chief one being that of boiling tubing in alkalized water. This comes from the old idea that tubing itself in some mysterious way is producer of reactions. It is true that prolonged boiling of tubing, as of solutions, will destroy pyrogen (the alkali is is no value), but here again we have weakened tubing, wet and unsuitable for placing in the usual I.V. set which usually is autoclaved. It is, however, much superior to the tubing cleaned in a haphazard way and allowed to dry since it is also sterile and will not produce pyrogens.

Far better than this method, however, is the cellophane disposable tubing now supplied by several commercial manufacturers of solutions. This tubing is never in contact with tap water and thus is not contaminated by pyrogens. It is disposed of as soon as used, creating no problem in cleaning, and its cost is so low that it is actually cheaper than rubber tubing and the trained time necessary to keep rubber tubing pyrogen-free. Its widespread use during the war has proved its acceptability. Disposable rubber tubing is available also but here the manufacturer has often ignored the above concepts and furnished tubing already contaminated by rinsing with tap water and delayed sterilization. Some makes of this tubing are excellent, as witness many plasma sets, providing the tubing is discarded when used once only.

In blood transfusion technic, however, we are not so fortunate. Many antiquated sets are still in use and here improper cleansing, allowing pyrogens to be manufactured by not quickly sterilizing the sets, allows "tubing" reactions, and use of pyrogen-contaminated glassware and needles further adds to the hazard. These frequent and severe reactions often rob the transfusion of all the good it can do and does detriment to the patient. Disposable tubing (cellophane, rubber) and filters are now being manufactured, but to date these have not been too successful since no method is provided to bring positive pressure behind the filter until the column of blood finally reaches the needle and causes sufficient siphonage to force the blood through the filter. Undoubtedly this will be corrected in the near future, thus making the blood transfusion sets equally disposable and pyrogen-free. At present, use of disposable tubing and filters or, if these are unavailable, *careful cleansing* followed by *rinsing two or three times* with *pyrogen-free distilled* water and *immediate* sterilization is still the best method of preparing rubber tubing. Use of pyrogen-free vacuum bottles for drawing blood is another improvement on older methods often using pyrogen-contaminated glassware.

NEEDLES

In some hospitals using pyrogen-free solutions and cellophane sets, reactions may still occur, often bewildering to personnel. Careful examination of needles will often show dirt, contamination, or blood within the haft of the needle. Even without this, needles often are cleansed and allowed to stand for some time before a batch is sterilized, be it boiled or autoclaved. Here, then, is another source of pyrogen for which one must be on guard.

SENSITIVITY

Observation during the past few years has led me to believe that a difference exists in sensitivity to pyrogen. Thus, one patient in a ward may have successive reactions while others have none, though the same technic and sets were used. This variance in sensitivity first became apparent in connection with another phase of work we were doing with pyrogen in 1931. At that time we were using pyrogen to produce foreign protein reactions in treatment of Buerger's disease and other vascular diseases of the extremities. We prepared our pyrogen by concentrating under vacuum large quantities of pyrogen-positive distilled water, then autoclaving it, and injecting it intravenously. Many patients reacted differently to varying doses, and occasionally a patient reacted violently with chills and fever for 24 hours, whereas another patient receiving the same dose had no reaction or only slight temperature elevation. When a sensitive patient is discovered, it is needless to say that greatest precautions must be taken, or fluids should be administered by other methods.

PYROGEN

We know that pyrogen is a proteinlike substance containing nitrogen (L.A.R., 30); that it is of alkaline reaction, the product of certain bacteria. Nevertheless, little else is known about it. Co Tui has demonstrated that while it passes through the Berkefeld filter it will not pass through a Seitz filter of 200 seconds but will pass through a similar 42 second filter. Thus he has concluded that the size of particle of pyrogen is somewhere between one micron and 50 millimicrons. No further knowledge concerning the chemical nature of pyrogen has thus far been established. Its widespread occurrence, the ideal condition for growing in water systems and the fact that a reaction towards it takes place in the human and animal body have led me to speculate concerning it. It has been observed clinically that hypersensitive patients frequently are those suffering with advanced malignancy. This opens room for speculation on the possibilities of pyrogen as a carcinogenic factor. This I have not had the facilities to investigate. It is certain, however, that all human beings and animals ingest it in drinking water and the body must set up some sort of reaction to it or we would have no reaction when it is introduced intravenously. Seibert, in one of her original papers, went so far as to state that the foreign protein reaction to milk and other protein then being used was due entirely to pyrogen. Further study of these interesting phenomena may some day prove of real value.

SPEED SHOCK

Many articles have appeared in the recent literature concerning speed shock. So much heed has been paid these articles that I frequently see patients with arms outstretched or fastened to splints for a whole afternoon—even a whole day—to receive one injection of 1000 cc. of saline or glucose. Aside from the discomfort to the patient and the long nursing observation necessary, this slowness in itself may frequently defeat the very purpose for which the infusion is given. A patient suffering with acute achloremia will not be much benefited by an intravenous infusion at 20 to 40 drops per minute; he may lose more chloride through stomach drainage or vomiting than the infusion is putting into his vein. I do not deny that "speed shock" may occur, but my own observation is that it occurs only in those with poor cardiac reserve, or right heart embarrassment (pulmonary embolism, cardiac tamponade, etc.) if solutions are run in at a reasonable speed. In the thousands of infusions I have given or observed I have never seen an instance of "speed shock" if these complications are absent, even though as much as 1000 cc. of solution is given in the course of 15 minutes. In my opinion "speed shock" is being overemphasized greatly to the detriment of the use of intravenous therapy. I repeat again, however, that in the presence of poor cardiac reserve, or embarrassed right heart, solutions must be given slowly. In the presence of shock especially, intravenous therapy must be given quickly—started quickly and run in rapidly—to be of any value. The large amounts of plasma and blood given the seriously wounded during World War II provide ample witness to the truth of this necessity.

Strumia has called attention to at least one indication for the slow administration of blood. That is, that in case blood is mismatched or contains an rH incompatibility, if it is given slowly, untoward reactions of this type can be detected when only a small amount of blood has been administered and the transfusion can be discontinued. Moreover, he has shown that the severity of such a reaction is in direct proportion to the amount administered. He also calls attention to the fact that in mild contamination with pyrogen, that reaction may be prevented by slow administration. With pyrogen-free solutions and sets, however, speed of injection can make no difference except as regards speed shock as discussed above.

EDEMA, HYPOPROTEINEMIA, HYPERCHLOREMIA

When intravenous solutions were found safe, huge quantities of saline and glucose were often given to seriously ill patients with the idea of "diluting and flushing out toxins." The result was that 8000 to 12,000 cc. per 24 hours were administered. Moderate to severe edema of extremities, presacral regions, etc., and often pulmonary edema resulted. More recent investigations showed the danger of introducing such excessive quantities of fluid without control of electrolyte balance and proper blood protein. The use of the hematocrit, blood protein and blood chloride tests are now essential in the proper administration of large quantities of fluids and all these complications of edema, pulmonary edema, hypoproteinemia and hyperchloremia may now be avoided by proper choice of solutions as guided by these tests. The use of amino acid solutions has recently been added as a means of controlling hypoproteinemia. While the solutions commercially prepared are probably free of pyrogen, a different type of reaction is frequently seen after administration of these solutions. This is more of a shock type of reaction, with hives, redness of skin, respiratory embarrassment, dropping blood pressure, even when solutions are given slowly. This reaction probably is a sensitivity reaction such as one sees with the intravenous administration of animal sera. Chills and pyrexia also may occur but the reasons discussed above—tubing, needles, etc, probably are the factors producing these reactions.

SUMMARY AND CONCLUSIONS

This paper reviews the actual facts concerning pyrogens and reactions to intravenous injections as far as known today, and suggests methods of eliminating the occasional reaction seen if all the principles enunciated in a previous paper are adhered to. Speed shock and the newer concepts of intravenous therapy are reviewed, with the author's ideas drawn from personal experience. The proper preparation of solutions, use of disposable cellophane tubing, proper care of needles are emphasized, together with a suggestion that whenever one is in doubt a safety factor lies in the waste of 100 cc. of solution by allowing it to run through the set and needle before beginning the injection proper.

SOMMAIRE

Cette communication passe en revue nos connaissances sur les pyrogènes et sur les réactions des injections intraveineuses et suggère des méthodes pour éliminer les réactions occasionelles rencontrées. Tous les principes énumerés dans notre communication précédente sont en revue. On discute les nouvelles conception de la thérapie intraveineuse et l'auteur fait des recommandations basées sur son expérience personelles. On étudie la préparation des solutions, l'emploi de tubes en cellophane disposables. On suggère que lorsqu'on est en doute il importe de passer 100 cc. de la solution dans l'ensemble de l'appareil de aiguille de passer avant de commencer l'injection.

RIASSUNTO

In questa rivista sintetica l'A. riassume tutti i dati concernenti le sostanze pirogene e le reazioni che insorgono dopo fleboclisi. Passa in rassegna i piu' moderni concetti riguardanti la terapia intravenosa. Discute la preparazione piu' appropriata delle soluzioni: l'uso di tubi "cellophane" da scartarsi di volta in volta: la preparazione piu' adatta degli aghi. Qualora esistano dei dubbi, la migliore misura precauzionale consiste nel fare defluire 100 cc. della soluzione attraverso bottiglie, tubi, aghi, prima di iniziare la fleboclisi.

SUMARIO

Se ha presentado un estudio de las reacciones pirogenicas y otras que resultan de las inyecciones intravenosas y se sugieren metodos preventivos. También se hace una revista de los conceptos modernos sobre la terapeutica intravenosa y del shock. Se recomienda gran cuidado en la preparación de las soluciones, asi como de los aparatos que son necesarios para la administración de preparaciones por via intravenosa, incluyendo el uso del tubo de celofano. También se sugiere se deje correr como cien centimetros cubicos de la solución antes de comenzar la inyección para asi lavar el tubo de celofano y la aguja de impuridades.

Twin Stitches: A New Technic*

ROBERT TAUBER, M.D., F.A.C.S., F.I.C.S.
PHILADELPHIA, PENNSYLVANIA

THE suture method described below constitutes a technic which facilitates the task of suturing tissues in situations presenting extraordinary difficulties, either because of tension or relative inaccessibility. Moreover, the method promotes the formation of a transverse band of tissue, which gives very useful support in certain operations.

The suture consists of two equal stitches, termed "twin stitches" because they are applied in identical manner and tied by means of two square knots.

TECHNIC

Two separate quarter-length sutures (A and B Fig. 1a) are applied in the same direction, either parallel to each other or in slightly convergent lines. Instead of following the usual procedure of tying both ends of the same thread, that is, A1 and A2, and B1 and B2, the basic idea of the twin stitches consists in fastening one end of A to the corresponging end of B. Thus, A1 is tied to B1, and A2 to B2 (Fig. 1b). For technical reasons, it is best to begin with the lower end of the threads, and to tie A2 and B2 before joining A1 and B1.

Since no resistance is encountered when A2 and B2 are united, one must avoid exerting traction on the threads while knotting the two ends, and one must be careful not to pull the threads out of the stitch canals. The ligature should be left long after the first square knot has been fastened, lest the knot be loosened while the other ends (A1 and B1) are being tied, a procedure which generally must be done under a certain amount of tension. In order to avoid loosening of the second knot (A1 and B1) while tying under tension, it is advisable to grasp and hold the first half of the square knot with the outermost point of a small hemostat until the second half of the square knot has been securely tied. This method has been found to be more satisfactory than that of the "surgical knot," for the latter does not prevent loosening either and, in addition, makes a rather large knot. There is little danger of damaging the thread by gentle application of a fine hemostat to the first half-hitch if care is taken that the knot is merely held in place, and not crushed, by the instrument.

The use of this suturing method will be illustrated in a number of vaginal operations, and it will be seen that the efficiency of the surgical procedure is enhanced by the twin stitches. This improvement, in turn, makes it possible to extend the scope of the given operation. Thus, in many a case, one can undertake simpler operative procedures which would be inadequate without the twin-stitch technic. On the other hand, a more radical intervention may be made possible because the technical problems involved are considerably simplified by the use of the twin stitches.

BIOPSY OF THE CERVIX

In a biopsy of the cervix, the usual procedure of removing only a small piece is not adequate. It is advisable to excise a larger wedge-shaped piece, in order to give the pathologist the opportunity to carry out his histologic investigations on a reasonably extensive scale. Employment of the twin-stitch technic will greatly facilitate matters in operations of this kind, notably in checking the bleeding which is naturally more copious when biopsy material of some size is removed.

Technic. Let us assume that the suspected part of the cervix is at 3 o'clock. The first of the twin stitches (A) is applied at 1 o'clock, the second (B) at 5 o'clock, but the ends are not tied (Fig. 2). A wedge-shaped piece of the cervix is excised between 2 and 4 o'clock. The ends of the applied ligatures in the inside of the cervical canal (A2 and B2) are now tied and left long. Thereupon the ends on the outside of the cervix (A1 and B1) are united in the same manner. The gap resulting from the excision is thus closed, and usually the bleeding is controlled by the first

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* From the Department of Gynecology, Graduate School of Medicine, University of Pennsylvania, Philadelphia, [illegible]

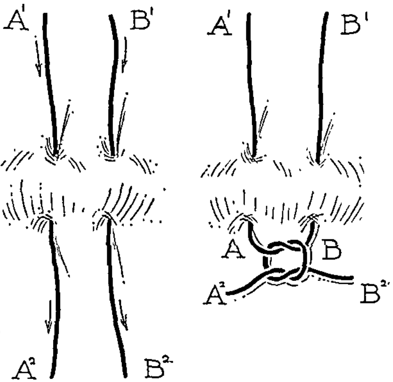

Fig. 1. Twin-stitch technic. Two separate quarter-length sutures A and B are applied in the same direction parallel to each other. A2 and B2 are tied first and then A1 and B1. A2 and B2 are tied first because the ligatures should be left long to avoid loosening of the knot while tying the opposite knot frequently under tension. If A1 and B1 are tied first the dropping ligature which has been left long would interfere with tying the lower knot A2 and B2.

set of twin stitches. Needless to say, a second *and third set of twin stitches may* be applied to close the remainder of the wound.

Since employment of the twin-stitch technic makes the operation (notably in the control of bleeding) so much simpler and easier, it should be the established rule that excisions from the cervix for diagnostic purposes should be wedge-shaped and of sufficient size. Biopsies should not be done in the office, for small pieces of tissue are of limited diagnostic value and indeed may lead the physician to overlook the cancer in its all-important, early phase.

AMPUTATION OF THE CERVIX

The twin-stitch technic has been found extremely useful in cervical amputations performed in accordance with Sturmdorff's idea of inverting the vaginal mucosa into the cervical canal. Application of the twin stitches is easy and there is little danger of making a technical error. Likewise there is less danger of having the needle break or the thread getting snarled. Besides, the twin stitches have the advantage of reinforcing by means of the first knot, the very point at which the suture is most likely to tear.

TECHNIC

One tenaculum forceps grasps the anterior, and one the posterior lip of the cervix. A circular incision is made around the cervix, saving as much vaginal mucosa as will be necessary for the subsequent inversion. The vaginal wall is pushed backward, and the sutures designed to control the bleeding are applied at the appropriate height on both sides of the cervix. The twin stitches are applied immediately, following conical amputation of the cervix. Every twin stitch must *begin and end on an intact* surface. The anterior set of twin stitches starts on the *intact* surface outside of the cervix, pierces the wall of the cervix, runs through the cervical canal, and then pierces the anterior flap of the vaginal mucosa near the edge of the incision, going in the direction from the wound area to the *intact* surface (Fig. 3). A and B are applied in the same manner, close together and parallel to each other. Thread ends A2 and B2 are tied by means of a square knot, and the excess ligature left long. Traction on A1 and B1 draws the vaginal flap into the interior of the cervical canal. Then ends A1 and B1 are tied in the manner described above, and all excess threads are cut off.

The posterior set of twin stitches is best applied by first piercing the vaginal flap from the *intact* surface to the wound area, and then running the suture from the interior side of the cervical canal to the *intact* exterior side of the cervix. A and B are applied in the same manner, close together and parallel to each other. The ends of the twin-stitches *on the vaginal flap* are first tied and left long. Traction on the other thread-ends serves to draw the vaginal flap into the interior of the cervical canal. The ends at the cervix are then tied, in the manner previously described, and all excess threads are cut off.

URINARY INCONTINENCE

Having obtained gratifying results with the twin stitches in 17 operations for urinary incontinence, I feel that this new technic may be recommended for operations for urinary incontinence. It would take us too far afield to engage in a detailed discussion of the causes of incontinence and of the various operations that have been recommended to cope with this affliction.

It should be mentioned, however, that a dropped floor of the bladder neck is now generally regarded as an important factor in the etiology of urinary incontinence, and that the main objective of surgical intervention is to lend fascial support to the dropped neck of the bladder. Special stress is laid on the formation of a transverse fascial band, the purpose of which is to improve the action of the sphincter by raising the floor of the bladder. In the formation of this band one encounters the same difficulties as in other fascial sutures which must be fastened under tension. The strong fascia, which is to serve as support, is often accidentally severed by the thread. To prevent such an occurrence, U-shaped stitches or mattress sutures were made. It should be noted, however, that both of these procedures require the "back-hand technic" to apply the suture to the patient's right side. The needle must be placed in the needle-holder in the reverse position and the hand must grasp and guide the needle-holder as in making a back-hand stroke in tennis. Under these circumstances, it is difficult to operate with skill and precision. Use of the twin-stitch technic makes it easier to deal with this important phase of the operation. The formation of the transverse fascial band is more accurate and this makes for better results. The twin stitches virtually eliminate the danger of a break in this important suture, which must often be tied under considerable tension, because the first square knot strengthens just the point where the suture usually breaks. This obviates the necessity of any more stitching and any further weakening and damage to the fascia.

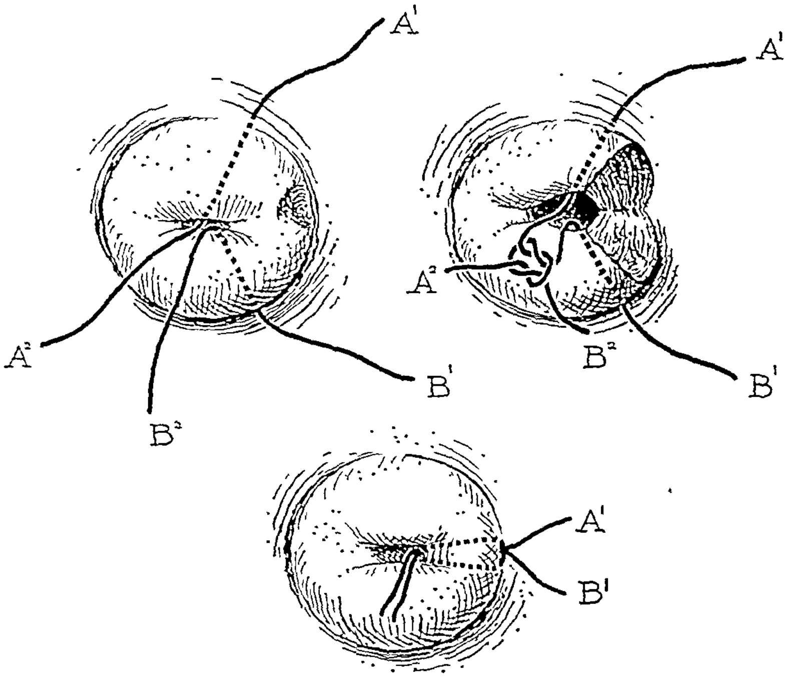

Fig. 2. Biopsy of the cervix. The twin stitches A and B are applied at 1 and 5 o'clock and a wedge-shaped excision of the suspicious area is performed. A2 and B2 in the inside of the cervical canal have to be united first. By the following tying of A1 and B1 the bleeding is controlled and the gap closed.

Technic. A midline incision is made through the anterior vaginal wall from about 1 cm. below the external urinary meatus toward the cervix. The knife cuts through the entire thickness of the vaginal mucosa, but not through the underlying vesicovaginal fascia. By working from the outside of the vagina toward the fascia, it is easy to find the line of cleavage between the vaginal mucosa and the septum. Following plication of the fascia, should this be necessary in the case of a cystocele, the twin stitches are applied to the right and left of the neck of the bladder, in the sphincter region. It is unnecessary to mark this site by introducing a mushroom catheter, for the main objective of the operation is not to suture the sphincter, but rather to raise the neck of the bladder. When the twin stitches have been applied, the lower ends, that is, A2 and B2, are tied and left long. The knot should be a flat square knot. Now the upper ends, A1 and B1, are tied and, as described above, the first half of the square knot, which must be drawn under more or less tension, may be held in place with the outermost point of a fine hemostat until the second half has been completed. It is well to have each of the twin stitches take considerable bite of fascia which can readily be done with the aid of a fine, moderately curved needle. The principal aim of the twin stitches is to promote the formation of a sturdy, transverse band of tissue at the neck of the bladder, near the sphincter area (Fig. 4), since this approach has been found most effective in the management of urinary incontinence. Catgut, or preferably some nonresorbable material such as silk or linen may be used for suturing.[1,2,3,4]

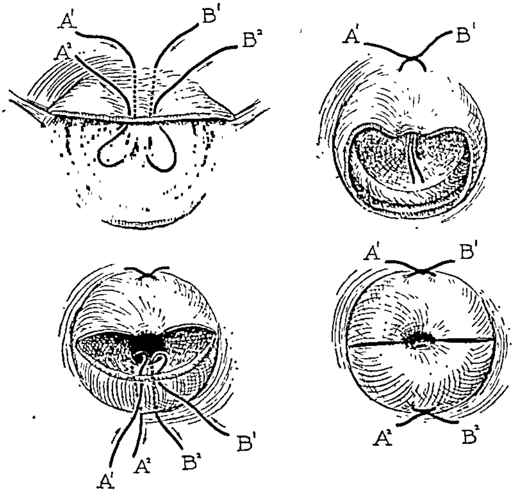

Fig. 3. Amputation of the cervix. The anterior set of twin stitches A and B starts on the *intact* outer surface of the cervix, runs through the cervical canal and ends on the *intact* surface of the vaginal flap. A2 and B2 are tied first. Traction on A1 and B1 pulls the vaginal flap into the cervical canal. Then A1 and B1 are united. The posterior set of twin stitches A and B starts at the *intact* outside of the vaginal flap, runs through the cervical canal and ends at the *intact* outside of the cervix. Here A1 and B1 are tied first in order to pull the vaginal flap into the cervical canal by traction on A2 and B2. Then A2 and B2 are united.

UTERINE PROLAPSE

The twin-stitch technic can be used to advantage also in suturing the broad ligaments in operations for uterine prolapse. The twin stitches make it possible to promote the formation of a double, transverse "bridge" of fascia in front of the cervix, without cutting through a part of the broad ligament, and [illegible] involving the the cervix in the suturing process. The prime objective of uniting the broad ligaments with the aid of the twin-stitch technic is both to support and raise the cervix and thus to create an axis about which the uterus can turn in the sagittal plane. The intraabdominal pressure is exerted against the posterior wall of the uterine body and causes the uterus to revolve on the newly formed fascial band, which serves as an axis.

Technic. A tenaculum forceps grasps the anterior lip of the cervix. An inverted T-incision is made through the entire thickness of the anterior vaginal mucosa, and the vaginal mucosa is separated from the fascia, which is left intact, on the bladder. The excess vaginal mucosa is resected, and the fascia are plicated over the cystocele. The twin stitches are applied to the tissue of the broad ligament on the right and left sides of the cervix and the lower square knot is tied. The tenaculum forceps is then removed from the cervix, and the cervix is pushed back [illegible] second square knot of the twin stitches is tied. The vaginal mucosa is closed, starting at the cervix and working in the direction to the urethral meatus. A colpoperineorrhaphy completes the procedure.

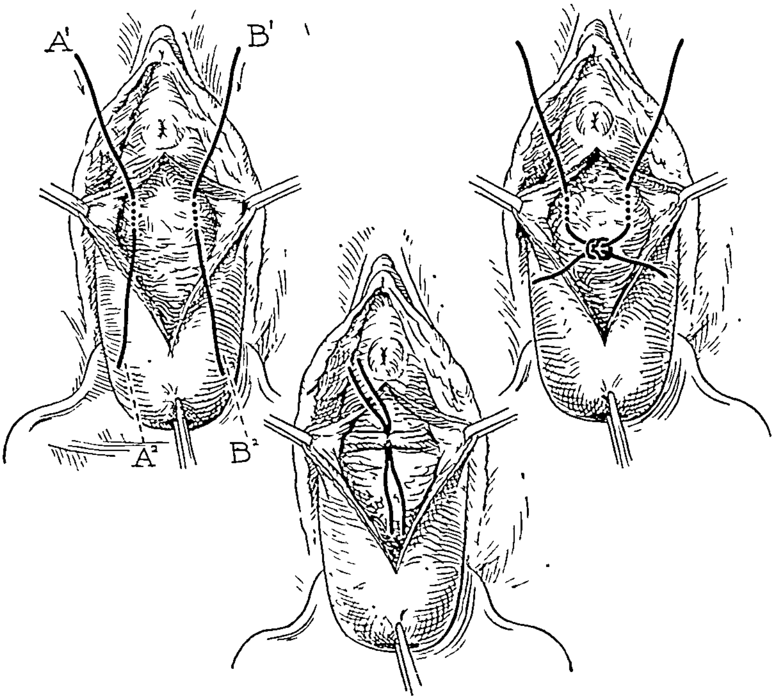

Fig. 4. Formation of a transverse band at the bladder neck against urinary incontinence. The twin stitches A and B are applied to the right and left of the bladder neck in the sphincter region. A2 and B2 are tied first and left long, then A1 and B1 are united.

SUMMARY

This report presents a description of the twin-stitch techniic and its use in various vaginal operations.

The advantages of this new technic are: exact hemostasis; avoidance of tissue damage; avoidance of damage to suturing material when tying under tension; formation of bands of fascia, which serve as valuable points of support; simplification of the technic of difficult steps in certain vaginal operations.

The twin-stitch technic is briefly described in its application to the following operations: biopsy of the cervix, amputation of the cervix, operation for urinary incontinence, and operation for uterine prolapse.

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Subphrenic Abscess

M. J. RAJANNA, M.D., F.I.C.S.
MINNEAPOLIS, MINNESOTA

"Shakiness of the hand may be some bar to the successful performance of an operation, but he of a shaky mind is hopeless."—Sir Frederick Treves

SUBPHRENIC abscess is rarer than in former days. There is little doubt that the general adoption of Fowler's position in cases of peritonitis is the principle reason for the decline in the incidence of this grave complication.

An important consideration, and one which is not generally appreciated, is that in a high percentage of cases subphrenic *infection* resolves, consequently many cases of this infection pass through our hands, perhaps unsuspected, but never concretely diagnosed; Alton Ochsner places the number of cases falling into this category as high as 70 per ent It is only when suppuration occurs that ailure to diagnose the condition spells dis- ster, for unless the abscess bursts into the ronchial tree, the patient is doomed. Sulfa- ilamide and penicillin therapy doubtless help o increase the number of cases of subphrenic *ifections* which resolve. The exhibition of ese drugs in cases of subphrenic *abscess* ay, by masking the symptoms, counterbalance the good that can be expected by their ministration in those cases which have not ached the stage of suppuration.

Examples of subphrenic suppuration are ill sufficiently common to make it imperative r the surgeon to study the subject closely. t the outset he must face the fact that for any years subphrenic abscesses have been ked with a formidable mortality. If unre- orted cases, and those patients who die with- ut drainage of the abscess, are taken into nsideration, the death rate can be little short 40 per cent. The chief obstacle to overcome "too late"; the diagnosis, always difficult, often becomes confused because of con- mitant signs in the base of the lung.

Complicated nomenclature and the tendency surgical and pure anatomists to utilize subdivisions of this space as an arena for testing a candidate's knowledge of anatomical relations have too often resulted in a feeling of dismay in those who need to refresh their memories quickly on the possible disposition of a collection of pus beneath the diaphragm. Most of these abscesses occur on the right side; the right posterior space is the one most frequently involved. A right anterior subphrenic abscess is often associated with a subhepatic abscess. To most surgeons, subphrenic abscess means right subphrenic abscess. Consequently, subphrenic abscesses on the left side, which should be expected once in every four or five cases (Carter), are missed or diagnosis delayed unduly even more often than with those on the right side. To keep the condition in mind is half the battle. Some subphrenic abscesses are not confined to a single space; Graham has encountered two cases where both the left and the right side needed drainage.

THE PRIMARY LESION

Nearly all subphrenic abscesses follow a known intraperitoneal lesion. Heading lists of mass statistics of reported cases is acute appendicitis, with perforated peptic ulcer following not far behind. Then comes a miscellaneous collection of inflammatory conditions, on the relative frequency of which it is unprofitable to linger. I subscribe to Raw's observation that in cases of subphrenic abscess following perforated duodenal ulcer, the subphrenic abscess is frequently an extension of a subhepatic abscess. This suggests that if Rutherford Morison's pouch were drained more often in late cases of perforated duodenal ulcers, and in perforations that are difficult to suture, we should be spared quite a number of subphrenic abscesses.

DIAGNOSIS

"Sign of pus somewhere, signs of pus nowhere else, signs of pus *there*" was Barnard's aphorism, and it is a marvelous compendium of the clinical situation. One would have thought that, during the 40 years which have elapsed since Barnard framed this guide, advance in diagnostic adjuvants would have rendered the diagnosis more scientifically certain, and consequently less onerous. In order to explain my meaning; in Barnard's day, when a tuberculous kidney was removed, the operation had to be undertaken without preoperative proof of the exact location of the disease. Today, thanks to advances in radiology, cystoscopy and laboratory tests, we know beforehand precisely the location of the lesion and the integrity or lack of it of the contralateral organ. In the case of a tuberculous kidney, the clinician's responsibility for making the diagnosis is more than halved, it is quartered. I want to impress upon the reader that in cases of subphrenic abscess, the surgeon in charge of the case must take the whole responsibility for making the diagnosis, and be thankful for a modicum of help from outside sources. *He must not rely upon the laboratory.* To know that the patient has a high leucocyte count is of considerable assistance, but this is all the help that can be received from this source. *He must not rely on radiology.* Most of my patients have been too ill to be sent with safety to the roentgen department: even if they were permitted to be transported thither, they were definitely not well enough to stand in an erect posture for the screening, which is, I understand, the only satisfactory method of visualizing the diaphragm. Roentgenograms taken with portable apparatus are not often helpful; I have several times been misled by the report on such findings. However, in the case of left-sided abscess, it may prove the means of elucidating the diagnosis. After swallowing barium, the patient is examined in Trendelenburg's position. If there is a left-sided subphrenic abscess, the stomach will be seen displaced downwards. Even a plain film with the patient in Fowler's position may reveal a bubble of gas beneath the diaphragm. This [illegible] is to be regarded as a sign of great [illegible] significance, but it is only when [illegible] have elapsed since laparotomy [illegible] is [illegible]; before that time it is often a snare and a delusion. After any laparotomy, a bubble of gas (ari) can frequently be demonstrated radiologically. By the end of the third week such a bubble should have vanished. *He must not rely on a physician.* Far be it from me to create an impression that I wish to ridicule or belittle the opinions of the many physicians with whom I have worked; on the contrary, I am forever indebted to them in many ways. In this instance however, I think it is unwise for the surgeon to endeavor to shift his responsibility. It so often entails repetition of various tests, which eventually prove inconclusive, that in some instances the opportune time for the operation is lost.

Needling for a subphrenic abscess should be forbidden absolutely. It may be quite justifiable to pass a needle into the pleural cavity to ascertain whether fluid is present and the nature of that fluid, but to pass the needle onwards in the endeavor to locate pus beneath the diaphragm is the quintessence of impropriety. Under no circumstances, whoever advises it, should the surgeon weaken his resolve to refrain' from attempting to confirm the diagnosis by this expedient, for if he does so and a subphrenic abscess is present, the pleural cavity will inevitably become seriously infected.

I wish it were possible to set out a list of visible signs upon which a diagnosis of subphrenic abscess could be formulated. No one has as yet succeeded in bringing forward even one sign that is proof positive. However, the following list of points may be helpful:

(a) When the primary lesion is situated in the right upper abdomen there is nearly always a purulent discharge from the wound;
(b) Watch patiently for Litten's diaphragmatic shadow;
(c) In cases of right posterior abscess, there is often tenderness over the eleventh interspace; to elicit this satisfactorily the patient must be turned on his face;
(d) In cases of *left*-sided subphrenic abscess, there is usually tenderness and sometimes swelling beneath the left costal margin;
(e) Just as in acute osteomyelitis there is a "sympathetic arthritis", so in subphrenic abscess there is concomitant basal pleurisy or pleuropneumonia.

It must therefore be clearly understood that a pleural effusion and/or some consolidation of the base of the lung on the corresponding side helps rather than hinders the diagnosis of subphrenic abscess.

DRAINAGE

I was brought up in Barnard's school. Actually that brilliant surgeon had died before I started my studies, but his teachings still prevailed; many of them have proved to be of permanent value. Regarding the treatment (as opposed to the diagnosis) of subphrenic abscess, this was not the case. I was taught to drain a subphrenic abscess by the transpleural route. The mortality following the procedure was depressing. As time went on, I effected a little improvement of my own practice by conducting the operation in two stages in order to promote adhesions between the layers of the pleura.

Although it is probable that there are still a few examples where the transpleural route is the method of choice, I completely revised my technic following the publication of Ochsner and Graves' paper. Before reading that, it had never occurred to me to drain the common right posterior subphrenic abscess extrapleurally through the bed of the resected twelfth rib. I also found that Ochsner and Graves' common sense method of draining an anteriorly placed abscess through an incision beneath the costal margin was a revelation of efficacy.

SUMMARY

Special emphasis has been placed on the diagnosis of this comparatively rare condition, because the usual diagnostic aids, such as laboratory and roentgen examinations, are not sufficient to establish the diagnosis. The surgeon must make himself thoroughly familiar with the entire picture of the condition and he must remember that such an expedient as needling for a subphrenic abscess is quite forbidden. The treatment, especially the technic of drainage, is discussed.

RÉSUMÉ

L'auteur décrit minutieusement cette condition relativement assez rare. Il étudie surtant les difficultés du diagnostic de cet état, et il notis dit que le laboratoire et les x-rayons ne suffisent pas pour établir positivement le diagnostic d'abcès sous-phrénique. Il est dangereux d'avoir recours à la ponction pour établie le diagnostic. Le traitement et surtout la technique du drainage sont étudiés et discutés.

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A Historical Review of the Appendix and Its Disease

T. SESHACHALAM, M.D., L.M.S., L.R.C.P., M.R.C.S., (Eng.)
BANGALORE, INDIA

THOSE who are concerned with the management of appendicitis should not be unmindful of the story of its development. Surgery owes its progress to imagination which raises a surgeon above mediocrity. The first person who removed a crushed limb, the first man who used the branch of a tree as a splint for a broken bone, the first who tied a bleeding vessel and the first who recognized the value of antisepsis—these were the great pioneers in surgery who exhibited the gift of imagination.

It is difficult to believe that the appendix baffled scientific imagination for generations. The earliest account in existence of evacuation of pus from the right lower quadrant of the abdomen dates back to B.C. 50. A body found in Egypt belonging to the Byzantine period (A.D. 400) showed evidence of adhesions about an old inflammation of the appendix.

Anatomically, the appendix has been known since the sixteenth century; pathologically, it was recognized in the eighteenth century. Clinically, it is the product only of the nineteenth century, while surgical recognition was accorded it only in the latter part of that century. Most of the improved surgical work on diseases of the appendix and their complications has been done during the twentieth century.

Berengarius of Carpi identified the appendix in 1524, and it was described as an anatomic entity by Vesalius in 1543. Fallopius portrayed it in 1561, and Vidius gave it the name of vermiform appendix.

It was not until the middle of the eighteenth century, that any description of appendicular disease was found, and France claims the credit, for in 1759 Mestivier removed a pint of pus from the right iliac fossa. The patient died a few days later and at necropsy "a large rusty pin was found in the vermiform appendix." In the same period in France several collections of pus were evacuated in [illegible]. In each case the suppuration [illegible] caused by foreign bodies in the [illegible]

The nineteenth century brought clinical descriptions of the disease. In 1824, Villarmy wrote, "the earliest symptom appearing in the form of colic is probably accounted for by the inflammation and distention of the appendix. Its rupture occasioned an effusion which was responsible in turn for peritonitis." In 1827 Mélier wrote that acute appendicitis was a clinical entity which might, under certain circumstances, become a rapidly fatal disease. France would have continued its advance but for the unfortunate bigotry of Dupuytren whose reputation had great influence in France at the time. He was of the firm opinion that the inflammatory processes originated in the cecum and refused to believe that the appendix could be the seat of the trouble and thus blocked the way to progress. He was a firm believer in typhlitis and perityphlitis.

During this same period, in 1842, Parkinson, in England, called attention to perforation of the appendix as the cause of death in one of his cases. Having read the French publications by Mélier, English physicians searched out their own records. Bright and Addison of Guy's Hospital, set out minute details of symptoms elicited, signs observed, and necropsy findings in appendicular disease. It is deplorable that the students of Guy's Hospital, though they made so much of the medical diseases described by Bright and Addison, ignored their writings on the appendix which are epochal observations on appendicitis.

In the year 1848, Hancock of Charing Cross Hospital successfully operated upon a diseased appendix before fluctuation occurred.

It now remained for the Americans to take hold of the knowledge thus far acquired in the old world and to breathe new life into it. Willard Parker of New York in 1850 published four case histories in which evacuation of pus from the right iliac fossa was successfully carried out. Reginald Fitz of Boston, a pathologist, coined and used the term "appendicitis" for the first time in 1886, as opposed to typhlitis and perityphlitis. He wrote vigorously and persistently and called attention to the size, shape and position of the appendix and its bearing on clinical conditions. He emphasized the importance of early operative interference. As a pathologist, he found in his necropsy studies that in most of the fatal cases of so-called typhlitis, the cecum was intact, while the appendix was ulcerated and in some cases even perforated. From vast experience of postmortem findings, he maintained that the appendix was the cause of the trouble and not the cecum, and insisted that these cases which were sent to the postmortem room from under the care of physicians should be handled by surgeons. Thus by a pathologist's careful and intelligent study, lesions of the appendix have been taken over into the domain of surgery where they rightly belong and where they have stayed.

Perhaps the greatest early exponent of the operation to remove the appendix was Sir Frederick Treves in England who, it may be recalled, operated upon King Edward VII on the eve of his coronation. It was also Sir Frederick Treves who, for the first time, suggested removing the appendix during a quiescent period. The priority for doing the first successful operation goes to Charles Symonds of Guy's Hospital, who performed what he styled the "interval operation" on August 4, 1885. Arthur Hurst of Guy's Hospital says, "Charles Symonds performed the first interval operation not only in England but the whole world." In America, Morton, of Philadelphia, and Sands independently removed the appendix successfully in the year 1887. It is interesting to read an extract from the Lancet of June 4th, 1938. Samuel J. Smith from Southern Rhodesia writes, "It may interest you to know that it is now fifty years since the first operation of the removal of vermiform appednix was performed. It was performed in, I think, June, 1888, by Mr. (afterward Sir) Frederick Treves, upon myself at my father's home. I thought you might care to refer to it in your Journal as the operation subsequently became so casual. (I wish Mr. Treves and I had patented it.)"

The modern period dates from the work of Charles McBurney of America who in 1889 urged early operation, paid much attention to its pathology and described McBurney's point. By this diagnostic point, which has been of inestimable value, he clarified the diagnosis of the disease. Time, experience and advance in surgery has not diminished the importance of this contribution. The muscle-splitting approach for removal of the appendix goes under the name of McBurney.

One of the real pioneers of this period was John Ryerson Fowler of Brooklyn, New York, without whose name the history of appendicitis would be incomplete. Fowler's contribution to the subject, and which has given him world-wide fame, is Fowler's position, which he described in 1900. To quote his own words, "elevation of the (head of the) patient's bed 18 inches or more, thus causing by gravity the localization of infectious products in the pelvis where they are absorbed less quickly and whence they may be drained more readily." Extreme Fowler is sitting posture. Fowler himself succumbed to acute appendicitis.

John Murphy of Chicago, a great teacher of clinical surgery, has rendered inestimable service in the advancement of surgical knowledge. His fight on the question of appendicitis was dramatic. The disease was just becoming recognized for what it was, but the accepted treatment was to delay operation or to avoid it entirely. Murphy believed that delay was dangerous and for 14 years persistently accumulated evidence and finally completely overwhelmed the opposition. It was Murphy who made the point of "getting in quick and getting out quicker" in spreading general peritonitis. He developed the use of continuous saline solution per rectum which has come to be known as "Murphy drip."

In a series of similar cases Ochsner in America and Sherren in London proposed a method of tiding over, since called Ochsner-Sherren method, sometimes known as starvation treatment. The method comprises the withholding of everything by mouth, washing out of the stomach, continuous Murphy drip and injection of morphine. In 1904 both Murphy and Ochsner in America and Sherren in London published their epoch-making papers, Murphy on "spreading peritonitis after rupture of the appendix" and Ochsner and Sherren on "starvation treatment."

Obstructive appendicitis came to be talked about with the work of Sir D. P. D. Wilkey of Edinburgh, who proved that by obstructing the lumen of the appendix the secretion accumulated behind the obstruction and resulted in a mucocele if uninfected or an abscess in the lumen of the appendix if infected by *Escherichia coli.* Such obstruction, Wilkey said, may be caused either by stercoliths, fibrous stricture or a spasm of the musculature of the appendix.

Since his time two forms of appendicular disease have been recognized: (1) Appendicitis which is supposed to start as an inflammation in the mucous membrane of the appendix. (2) Obstructive appendicitis with resulting distention and consequent rupture. At this point it is relevant to consider the obstructive type.

The normal secretion of the mucous membrane of the appendix is drained into the cecum through the appendicular opening which is guarded by the valve of Gerlach, the function of which is unknown. Books on anatomy and physiology are silent, but living anatomy gives a clue. In his book, "Stepping Stones to Surgery," Rowlings of St. Bartholomew's Hospital draws our attention to the fact that with appendicostomy, which is no longer in vogue, fecal fistula does not occur because the appendicular valve of Gerlach allows appendicular secretion to drain into the cecum but prevents fecal matter from entering the appendix. This suggests that it is the function of the appendicular valve to permit only one-way traffic under normal conditions. In 1927 I drew attention to the fecal matter seen in the lumen of many of the appendices removed and then expressed the doubt that fecal matter so seen is a normal content of the appendix. Since then, after 20 years of experience, I have come to the conclusion that fecal matter in the appendix is a foreign body and is bound to give trouble. I would like to quote Menninger Kummel who is emphatic in saying, "No normal appendix contains feces. If such is found, then an early nidus for pathologic changes is present."

If there is some disturbance or disease of the appendicular valve, it loses control over the one-way traffic and fecal matter is allowed to enter the appendix and irritate the mucous membrane. Further, the normal progress of appendicular secretion is blocked, and the appendicular muscles go into spasm in an effort to get over the obstruction. This results in colic.

Living anatomy throws light on other conditions of the appendix not described by the anatomist. I have studies and sketches made during 1025 operations on the appendix over a period of 14 years. Of these, nearly 50 per cent are my personal cases, the rest being those of my chiefs, colleagues and assistants. At each operation a pencil drawing was made. Folds and bands as yet not described by anatomists, showing no inflammatory reaction, being apparently of congenital origin, were found passing from the appendix to the cecum and to the parietal peritoneum in the right iliac fossa. These bands bend, fold up, twist or screw the appendix in various ways. These are not the classical bands of the anatomists, but are bands in relation only to the appendix. In my series the following five types of deformities caused by these bands were noted:

1. The appendix is bent into a wide U by a short mesentery, the free border being much shorter than the attached border. The free border feels tense as a bowstring.
2. An acute kink of the appendix converting it into a V.
3. A twist of the appendix into one or two turns of a corkscrew.
4. Proximal two-thirds free and the distal third twisted into a single turn of the corkscrew.
5. Proximal two-thirds buried in the wall of the cecum, the distal third free.

At some time these kinks must cause obstruction of the lumen of the appendix, depending on peristaltic movements and consequent changes in its position. Naturally, appendicular secretion is blocked at the kink, resulting in distention of the distal part. Waves of peristalsis endeavor to eliminate the obstruction and typical attacks of pain result and persist until the obstruction is relieved and the lumen is free. Should the obstruction not be relieved, secretion in the distal part accumulates, increasing the distention. Such distention, if not relieved, may go on to rupture.

In a case of acutely bent appendix with the distal limb of the V drawn down by a series of tight bands to the right iliac fossa, the distal limb of the V is always thicker and harder with signs of greater vascularity than the proximal limb. It is significant that the moment the bands are cut during operation, the organ quickly straightens out and waves of peristalsis pass from the tip to the base. This is a guarantee that the obstruction at the apex of the V has been the cause of the trouble.

Fecal matter is not normal to the appendix. Once fecal matter enters and is unable to leave, it begins to dry up, a fecalith is formed which by virtue of its dryness and size cannot escape into the cecum.

Hence three factors are potent in causing obstruction to the free passage of the secretion of the appendix into the cecum: (1) Spasm of the appendicular valve of Gerlach; (2) bands and adhesions of congenital origin which kink and distort the appendix; and (3) fecal matter. These prevent the appendicular secretion from entering the cecum and cause distention of the appendix distal to the obstruction which in turn results in colicky pain. Depending upon the temporary or permanent nature of the obstruction the colic is either relieved or goes on to rupture of the appendix.

This leads one to ponder a little and ask whether the trouble with the appendix is obstruction first in all cases and inflammation second, following upon obstruction. Those cases which are styled inflamed appendix which subside without operation must be cases of temporary obstruction which are relieved. I am of the opinion that the primary factor in appendicular disorder is obstruction and not inflammation. Hence it is suggested that the term "appendicular obstruction" should take the place of "appendicitis."

SUMMARY

A historical survey is presented of the anatomy, pathology and clinical aspects of the appendicular disorder, particular emphasis being placed upon the part played by medical men of France, England and, later, the United States in increasing our knowledge of the subject. The function of the appendicular valve is considered. Obstruc*tion to drainage of appendicular secretion* into the cecum is considered the primary factor in the type of appendicular disease under discussion and it is suggested that the term appendicular obstruction probably will replace the term appendicitis in future.

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CASE REPORTS

Complete Rectal Prolapse

JAMES G KANSKI, M.D., A.I.C.S.*
BUFFALO, NEW YORK

A. S., female, 20 months, was seen Sept. 8, 1947, with a history of a red beefy tumor protruding from the rectum.

The mother gave the following history: About 2 months before, she noticed a cherry sized lump about the anus after a siege of diarrhea which had responded to the usual remedies. The lump seemed to disappear at times, only to reappear on crying or after defecation. The mass became progressively larger until it was as long as her index finger. For the week before the infant was brought for examination the mass remained outside most of the time. The infant seemed to be suffering from tenesmus, had lost weight and appetite and was very irritable.

Past history was noncontributory except for the diarrhea 2 months before and which had lasted 5 days. Birth weight was 6 lb., 9 oz. The first teeth came at 5 months, and the infant walked at 11 months. It was artificially fed; and was placed on whole milk at about 10 months. It rejected vegetables and cod liver oil.

Physical examination: The child was pale. Frontal fontanel was firm. The 16 teeth appeared to be in good condition. There was some flaring of the ribs at the costal margins. Lungs and heart were negative. Abdomen was soft and doughy, with the liver two fingers below the costal margin. Urethral and vaginal outlets appeared normal. Rectum: A red, beefy cone-shaped mass protruded 2 inches from the anus. It was covered with inflamed and thickened mucosa with areas of ulceration. The bowel opening was posterior to the apex of the mass and the rugae were prominent and circular. With some difficulty the mass was reduced but as the child cried continuously, it again prolapsed. The external sphincter readily admitted the thumb.

By elevating the legs and applying pressure the mass could be reduced. A narrow slit-like toilet [illegible] used which prevented separation of the [illegible] when straining at stool. The child was [illegible] schedule for a month but reduc- [illegible] maintained by adhesive strips [illegible]

[illegible] of the rectum, second degree, was diagnosed and surgical treatment advised. The patient was admitted to Mercy Hospital on Oct. 8, 1947, and operated on October 10.

Laboratory study showed nothing abnormal.

OPERATION

Sigmoidopexy, by the Bryant technic, was performed under anesthesia by vinethene with a preoperative injection of 1/300 gr. of atropine sulfate.

Incision. A 3-inch skin incision was made 1 inch medial and above Poupart's ligament on the left midway between the pubic spine and the left anterior superior spine. The external oblique fascia, internal oblique muscle, transversalis fascia were split in the direction of their fibers, and the peritoneum was cut obliquely. The parietal peritoneum was separated from the margins of the incision for about 1 inch, thus mobilizing two flaps that were utilized later in the closure.

Examination. There was marked mobility and redundancy of the rectosigmoid colon. No diverticuli were seen, nor pathology on the exposed ileum.

Technic of Operation. The sigmoid was pulled upward and outward and held taut with Babcock clamps, thereby reducing the prolapse. Also adjacent ascending colon was pulled downward medially, thus preventing the small bowel from coming in contact with the weak anterior wall of the rectum. Silk sutures on an atraumatic needle were used in anchoring the taut rectosigmoid to the anterior abdominal wall, the sutures going through the transversalis fascia, peritoneum, and longitudinal muscle band of the sigmoid of one side and the peritoneum and transversalis fascia of the other margin of the incision. Six interrupted sutures were used, and they were all placed before they were tied from below upward. The remainder of the skin incision was closed in layers with interrupted silk. The skin was closed with dermal.

The postoperative course was uneventful. The child was not restricted, in fact, she was up and about her crib three hours after the operation. The incision healed by first intention. Sulfasuxidine was administered and the bowels were allowed to move on the fifth postoperative day. The child left the hospital on the tenth postoperative day.

Examination two months after operation showed that there had been no reoccurrence of the prolapse.

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* [illegible] Mercy Hospital, Buffalo,

She had gained five pounds in weight, the skin incision was well healed, and the external sphincter was firm and admitted the little finger with normal resistance.

ANATOMY

The rectum is held in position by several supports, the lower portion by the levator ani muscles and covering fascia which fuse in the midline with the transverse perineii and coccygeal muscles, and the portion which forms the sphincters. Just above the levators and extending from the sacrococcygeal junction is the fascia propria of the rectum. This fascia completely surrounds the bowel, is situated just beneath the peritoneum and sends an extension around the prostate or the vagina to the symphysis pubis. Just above the sacrococcygeal junction are the triangular ligaments containing the middle hemorrhoidal vessels. These ligaments fix the rectum to the lateral pelvic wall. It is the weakening or congenital absence of one or several of the normal supports that allows for the complete prolapse of the rectum. The attachments are weakest in the anterior portions because of separation by the prostate, bladder or vagina.

Among the predisposing factors in complete prolapse are congenital anomalies, such as a long sigmoid, a low cul-de-sac, a decrease in the concavity of the levator ani and the rectococcygeal and pubococcygeal divisions of the levator ani muscles. Neurologic conditions such as tabes, and longstanding diarrheas or constipation also may play a part in producing the prolapse.

COMMENT

Skinner and Duncan expressed the opinion that if the pelvic colon could be pulled up until the rectum was taut and held in this position, at least temporarily, the cavity between the bowel and the sacrum would fill in with scar tissue, would produce firm fixation, and would also allow the levator group of muscles to regain their tone, thereby correcting the rectal prolapse. The case presented seems to bear this out.

In the case presented complete rectal prolapse in a 20-months-old girl was successfully corrected by an anterior fixation of the rectosigmoid colon to the anterior lateral abdominal wall.

Rinocifosis*

ADOLPH M. BROWN, M.D.
CHICAGO, ILLINOIS

ENGLISH SUMMARY

It is not advisable to attempt to classify each type of nasal deformity with an operation for each; there are so many intermediate types of deformity which alter the plan of treatment. These factors are: (1) the artistic anatomy of the face, (2) the artistic anatomy of the nose, and (3) the laws of optics as applied to the artistic concept of the face. To see the effect of the hump nose deformity on the face as a whole, before and after correction, the face should be considered in its sagital plane and divided diagrammatically into four horizontal areas of equal vertical dimensions. The uppermost area, that reaching from the ideal hair line to the top of the head, is generally not considered in great detail. The other three areas are important: (1) from the ideal hair line to the root of the nose, (2) from the root of the nose to the junction of the nose with the lip (top to bottom of nasal base), and (3) from the columella to the bottom of the chin. The nose itself is divided horizontally into five areas. These are based on the anatomic structure and are important for surgical, esthetic, and psychologic reasons. Esthetically the hump nose has a specific optic effect on the appearance of the face. While the eyes of a normal face are about one eye-width apart, those of the patient with a hump nose always appear closer together than they actually are, as well as smaller and beadier than they are. The nose must be shortened, therefore, for two reasons: (1) correction of the actual length, and (2) correction for the apparent increase in length due to the removal of the hump. Concern over a hump nose and its correction is justifiable. The patient with a hump nose deserves planned surgical treatment. All operations cannot be alike. The patient's new face should not be the result of the surgeon's momentary caprice at the operating table. It should be one carefully designed, with all the relevant factors of artistic anatomy taken into consideration.

DEMONSTRAR que es posible esculpir el tejido viviente, necesitó que pasaran centurias, que acontecieran muchas guerras y la curiosidad de muchos médicos. Hasta las guerras modernas la cirugía plástica se practicó casi en secreto por unos pocos cirujanos. Existiá el extraño prejuicio de que se utilizaba la habilidad quirúrgica, más bien en propósitos innecesarios, cuando esta era usada para mejorar la apariencia personal. Pero cuando las operaciones plásticas se utilizaron para corregir las deformidades dejadas por los traumatismos recibidos en la guerra, y se vió que el mejoramiento cosmético se hacía acompañar de una tremenda majoría psicológica, entonces fué que se consideró a la cirugía plástica, aunque con reservas, cirugía legítima. Desde entonces mucho se ha escrito sobre este asunto.

Los accidentes automivilísticos han reemplazado a los altos explosivos de guerra como causa principal de las deformidades, y lo mismo se requiere la ingeniosidad del cirujano plástico en la alteración de la forma o la reconstrucción de los tejidos viables, en los desfigurantes accidentes automovilísticos que después de las heridas de guerra. Asi como también remodela las deformidades hereditarias.

La apariencia personal es hoy en día de principal importancia en el campo económico. Pero no es sólo eso, sino que los pacientes con deformidades, especialmente las visibles, poseen una desventaja psicológica además de la estética, pues se tornan melancólicos a tal extremo que disminuye notablemente su habilidad para la obtención del sustanto diario.

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* [illegible] Dr. [illegible] Lozano, de la

La nariz está de tal forma situada, que las deformidades nasales son las más facilmente aparentes. Entre las deformidades nasales más comunes, que requieren operaciones plásticas, tenemos: la exagerada convexidad del dorso de la nariz, llamada por muchos rinocifosis (hump nose). Estas pueden ser clasificadas a grandes rasgos dentros de dos tipos: las congénitas y las traumáticas.

La nariz cifótica congénita, también llamada rinomagalia, es generalmente el resultado de una hipertrofia que envuelve el "puente caso" y a los cartílagos laterales ye alares.

En la que resulta de los traumatismos, la hipertrofia usualmente está limitada a los huesos y se caracteriza perfectamente por la protuberancia marcada de los dos quintos superiores del contorno nasal. Además, esta variedad presenta una prominencia mas aguda que las que se tienen congénitamente y, la hipertorofia es más ostensible vista desde el plano frontal, es decir, la porción superior es muy ancha.

Las rinocifosis muchas veces presentan además desviado el dorso de la nariz hacia uno de los lados y pueden ser atribuidas generalmente a traumatismos. Ambos tipos, congénitos y traumáticos pueden estar acompañados de otras anomaliás, tales como: tener la columnilla colgante, otras veces los orificios evertidos, el dorso colapsado o grandes desviaciones del tabique que desvián también al dorso. No es posible catalogar cada tipo de anomalía y clasificar un tipo de operación en cada caso, pues en la práctica son tantas las deformidades secundarias que se le presentan el cirujano y que él resuelve de acuerdo con las circunstancias, que mariá infinita la enumeración de los diferentes cambios de técnica que se ve obligado a introducir y que alteran cualquier plan general preconcebido de tratamiento.

Existe un tipo de deformidad nasal más llamativo que los otros, me refiero al producido por las resecciones submucosas del tabique, que por ser inexpertamente realizadas o mal indicadas producen su completo colopso.[1] Lo más grave es que algunos rinólogos, deliberadamente, practican resecciones submucosas con el fin de mejorar las rinocifosis. Este procedimiento está muy pocas veces, si alguna, justificado. Quizas si sus practicantes piensen que por lo menos ellos, al estirpar algun tejido nasal, estan reduciendo las dimensiones anteroposteriores de la nariz. Todo esto debe ser rotundamente condenado, pues el conocimiento de la anatomía nasal nos indica que solo dos posibilidades deben esperarse de tales procedimientos: que al paciente sea tan afortunado, que la resección no haya sido lo suficientemente extensa y su estética nasal no haya sido afectada; o que, por el contrario, el entusiasmo o capricho del operador haya sido tal, que la resección haya sido lo suficientemente extensa para dejar solo una estrecha cinta septal y en consecuencia las dimensiones anteroposteriores hayan disminuído en forma bizarra. El dorso de la nariz cederá por falta de soporte y eventualmente se colapsara, la parte osea, dejada sin tocar, se proyectará en prominente relieve, y las alas, dejadas sin su soporte normal que es al tabique, se aplastarán contra las mejillas, produciendo el perfil llamado "nariz aguilena." De manera que el paciente quadará con un defecto cosmética, lo suficientemente serio para atribular a la persona más indiferente de su apariencia personal y todo por al inexperiencia del cirupano tratando de conseguir un propósito tan pobremente concebido.

Mucho se has escrito sobre la técnica usada en las diferentes operaciones plásticas de la nariz, pero no se encuentra prácticamente nada acerca del arte anatómico envuelto en dichas operaciones. Sin embargo, en este caso el cirujano no solo necesita ser un maestro de la técnica quirúrgica, sino que así mismo le es necesario poséer un acertado criterio artístico de la anatomía de la cara. La deformidad nasal debe ser corregida de forma tal que sus líneas armonicen estéticamente con el resto de la cara del paciente; a pesar de lo cual, hay quienes como Straith[2] poseen su propria divisa mecánica con la que miden el grado de angulación del puente nasal y del de la columnilla.

No es posible aplicar el mismo patron a todas las caras, cada nariz debe ser remodelada de manera que encaje adecuadamente en la cara de su dueño, lo más exactamente posible. Los que no piensen así, háganse las siguientes preguntas; ¿Por qué son anti-estéticas las hipertrofias nasales, y por qué su corrección

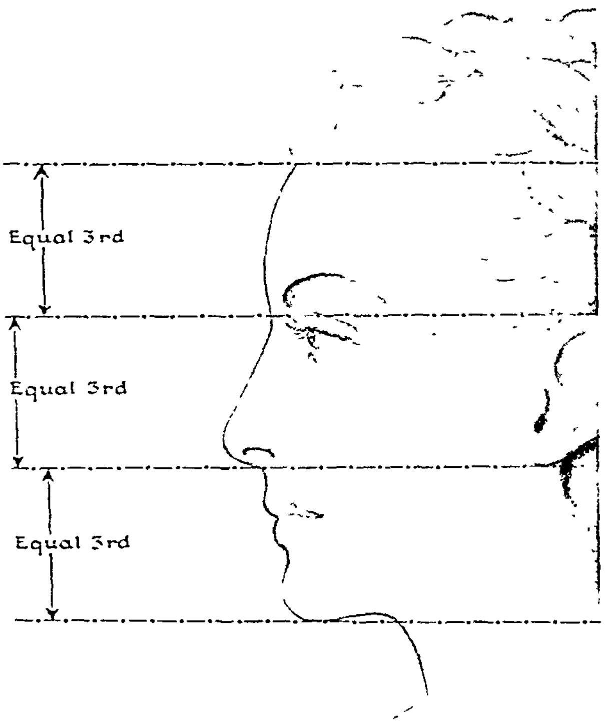

Fig. 1. Dimensiones verticales de la cara en total.

produce tal mejoramiento en la apariencia del paciente?

Varios factores anatómicos de índole estética están involucrados. No conociéndolos, el cirujano solamente obtendrá buenos resultados accidental u ocacionalmente. Estos factores son: (1) Las leyes estéticas de la anatomía de la cara, en general; (2) la estética anatómica de la nariz, en particular y, (3) las leyes ópticas que rigen la belleza de la cara.

Al estudiar el efecto que causan las deformidades nasales en el todo de la cara y buscar los efectos beneficiosos obtenibles con la corrección, debe ser dividido el perfil diagramáticamente, su plano sagital por medio de cuatro planos horizontales a distancias iguales (Fig. 1). El área superior comprendiendo desde la línea del pelo hasta el tope de la cabeza, no es considerado generalmente en detalle. Las otras tres son importantes: (1) la comprendida desde la línea del pelo hasta la raiz de la nariz; (2) de la raiz de la nariz hasta [illegible] de conjunción con el labio, es decir [illegible] inferior de la nariz y (3) [illegible] hasta la barbilla.

[illegible] que la nariz

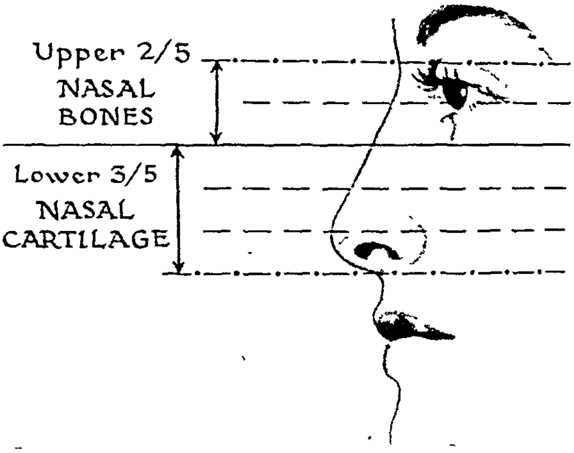

Fig. 2. Dimensiones verticales de la nariz.

ocupa exactamente el tercio medio de las dimensiones verticales de la cara y horizontalmente, generalmente corresponde al plano que ocupa la oreja, siento de las mismas dimensiones verticales que ésta.

Dibújese una "X" en la raiz de la nariz, una de las ramas paralela a la línea de la frente y la otra extendiéndose hacia abajo tocando tangencialmente a la barbilla. La nariz ideal nunca rebasará la rama "frontal," ni con la punta o el dorso. La "X" tendrá los ángulos agudos de 25 o 35 grados en las personas normales. La nariz normal tampoco rebasará la línea que cruza el surco nasolabial. Estos factores aunque resulten simples son estéticamente importantes.

Sigamos abundando en el tema de la armonía de las proporciones anatómicas de la cara y tendremos que el tercio inferior de la cara debe ser igual en el sentido vertical a cada una de la porciones superiores, como se indica en el diagrama. El área que ocupa el labio superior, idealmente debe ser un tercio del área correspondiente en las dimensiones verticales, a los labios y a la barba. En otras palabras: El tércio inferior de la cara se subdivide a su vez en tercios verticales, con el labio superior ocupando exactamente el tercio superior de la subdivision.

Sin embargo es conveniente mencionar aquí que estas dimensiones verticales pueden estar alteradas en su simetría por varios factores. La correspondiente a la frente es alterada ópticamente por la variación de la

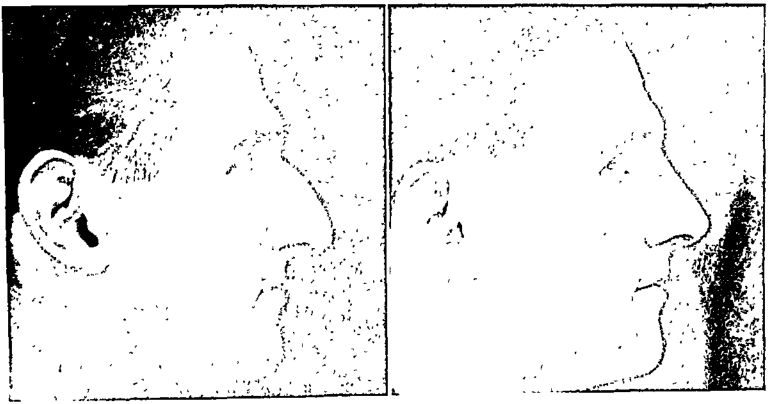

Fig. 3. Izquierda, hipertrofia generalizada de lar nariz Derecha, depues de la operacion. Notese la nueva armonia del perfil.

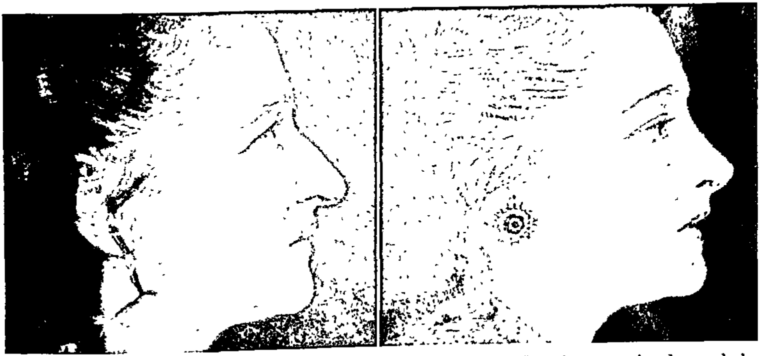

Fig. 4. Izquierda, nariz encorvada y alargada. Ventanas masculinas. Derecha, correccion depues de la plastica. Notest un perfil mas juvenil cuando la nariz has sido acortada.

línea de la cabellera debida a una alopecía en progreso. El tercio pierde frecuentemente sus proporciones a causa de la absorción de los maxilares, causada por la pérdida de los dientes, el deterioro de los mismo o su eversión (incisivos superiores).

Estas alteraciones deben ser objeto de la mayor atención, y en el caso particular de la pérdida o deterioro de los dientes el tratamiento comprende el uso de puentes o planchas con dientes mas largos, etc.

La propria nariz se subdivide en cinco areas (Fig. 2), teniendo en cuenta razones de índole (1) quirúrgico, (2) estético y, (3) psicologicas. Estos espacios son verticalmente iguales. Los dos superiores incluyen exactamente los huesos proprios nasales, y los tres inferiores incluyen los cartílagos.

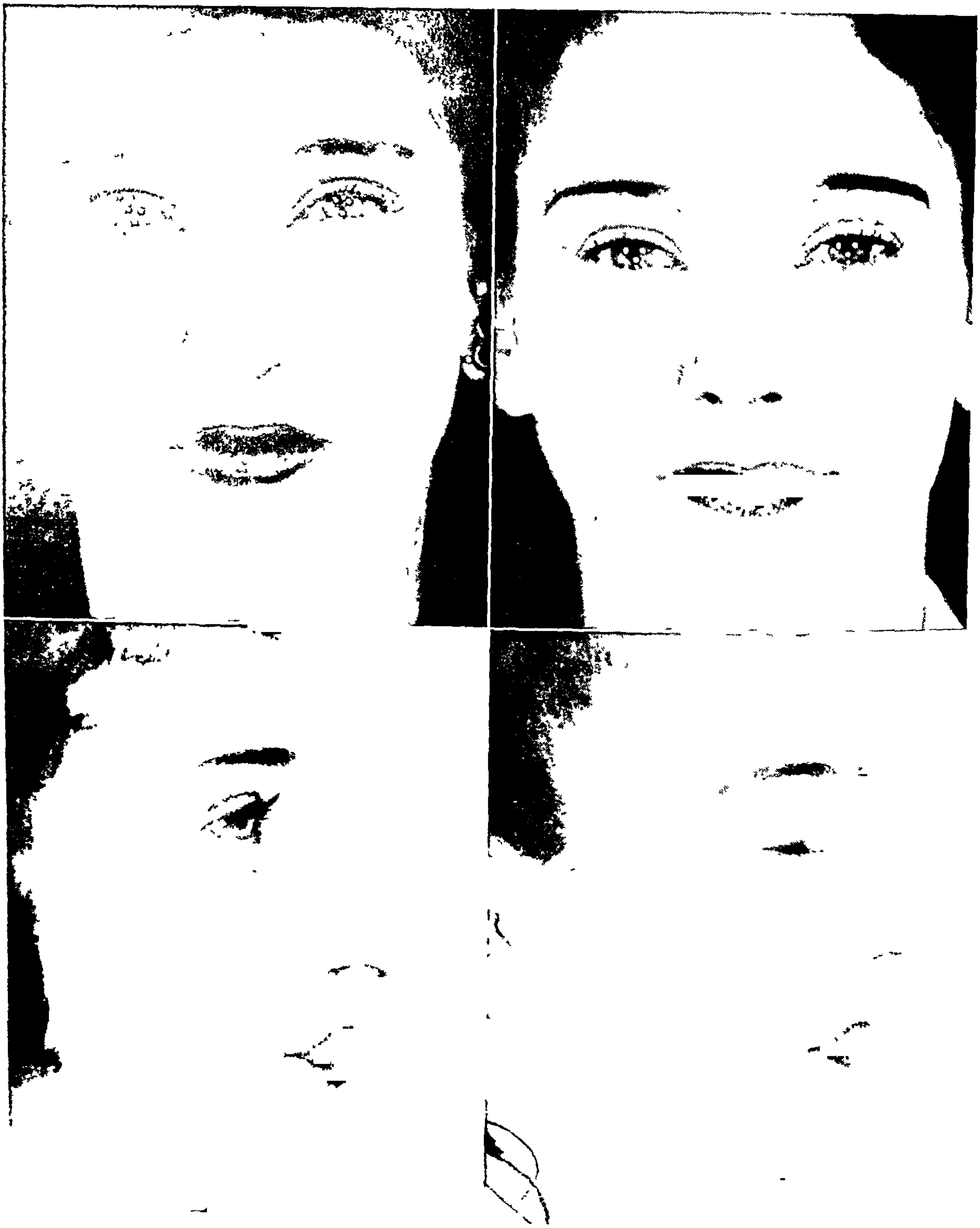

Fig. 5. Arriba, vista frontal de nariz encorvada y alargada, y depues de la correccion quiruriga. Notese como al disminuir la dimension vertical de la nariz le ha proporcionado armonia artistica y juventud a la cara. Observese ademas como los ojos lucen mas grandes. Abajo, nariz alargada y encorvada, y depues de la correccion quirurgica.

Es bueno que recordemos aquí que la nariz está sostenida en sus dos *quintos superiores* por los huesos nasales, rigidos e inflexibles, y en los tres quintos inferiores por los cártilagos laterales y el tabique. Ahora bien el septum *nasal es en realidad el sostén* principal de las partes blandas, siendo los otros cartílagos elementos accesorios. De manera que, si se reseca parte del tabique en su porción anterior, la articulación vomeriana se convierte en el principal sostén de resto. En consecuencia, las resecciones resultan pobres cuando se realizan muy cerca de este punto.

Las rinocifosis traumáticas envuelven generalmente los dos quintos superiores de la nariz y casi siempre presentan exóstosis centrales o laterales por la excesiva formación de callo óseo, otras veces por desplazamiento de los huesos, que puede ser lo suficientemente extenso que envuelva también el de las porciones cartilagiosas.

Por otra parte en las rinomegalias hereditarias, como ya mencionamos anteriormente, es afectada la generalidad de la nariz y comunmente asociada a los que se la dado en llamar "columela colgante."

Cuales son los efectos ópticos especificos que en el aspecto de la cara producen las anomalías de la nariz, es de lo que nos toca por tratar ahora. En primer lugar diremos que en las personas normales los dos ojos están a un ancho de ojo apartes, mientras que en los *pacientes con rinocifosis* ellos lucen mas próximos, más pequeños y prominentes de lo que son en realidad. Es que la nariz en estos casos tiende a captar los rayos incidentes de luz, *produce mayor sombra, todo lo cual* tiende a acentuar su prominencia y crea ademas la ilusión de ser más afilada y delgada. Todo esto afecta la estética nasal de una forma que *repercute en la personalidad del individuo*, produciendo la impresión psicológica en sus interlocutores que convencionalmente se ha venido usando para personificar al hampón, al *elemento maleante*.

Pero además nos queden por señalar otros aspectos del mismo asunto. Cuando lo nariz es excesivamente larga y terminada por una columela colgante, hace lucir al labio superior más delgado y reducido en sus dimensiones verticales. La mayor parte de las veces esto es causado por las sombras, pues estéticamente el borde inferior de la nariz debe encontrarse con *el labio* superior formando un ángulo de 90° o mas. Esto hace que, prácticamente, en casi todas las operaciones plásticas de rinocifosis, se requiera el acortamiento de las dimensiones verticales, porque la óptica hace lucir cortos los planos interrumpidos; y a los no interrumpidos, largos. Una nariz cifótica, si ya era larga, lucirá aun más después de nivelar el dorso. En conclusión, existen dos razones por las cuales la nariz debe ser acortada siempre durante las rinoplastias (1) corrección del largo propio y (2) del mayor largo que aparenta tener después de ser removida la eminencia osteocartilaginosa.

Cuando se acorta la longitud de la nariz, es menester hacerlo en un diez por ciento de mas, teniendo en cuenta el posterior descenso que ocurrirá debido a la delgadez y laxitud de los tejidos en juego.

Los detalles de los procedimientos quirúrgicos a sequir en la corrección de la deformidades nasales están descritos en la literatura. Sería bueno sin embargo recalcar aquí, algunos pasos imprescindibles en la obtanción de buenos resultados cosméticos. El primero es fotografiar al paciente y hacer una ampliación, siendo el perfil la pose más importante, pues sobre esta fotografía se trazan toda esa serie de planos ilustrados en los diagramas. Esta es la única manera de poder apreciar las verdaderas proporciones de la deformidad y sirve de guía excelente en el planeamiento de la operación correspondiente.

Lo siguiente es tomar una impresión o negativo en yeso, de la cara, es decir obtener una mascarilla que incluya la frente y los labios. De esta manera se pueden obtener impresiones positivas en gelatina y se la deformidad presenta aspectos poco usuales, se pueden calcular en ella los resultados de la corrección. Un modelo final en yeso se conserva para el archivo.

Refiriéndonos a la operación en sí diremos, en especial, que cuando la rinocifosis es acompañada además, de anchura de la base, la eliminación de la prominencia debe ser seguida por la *separación de los muñones óseos de* sus suturas maxilares, por fractura y la reposición de los mismos, de manera que obtengamos una nueva pirámide a base más es-

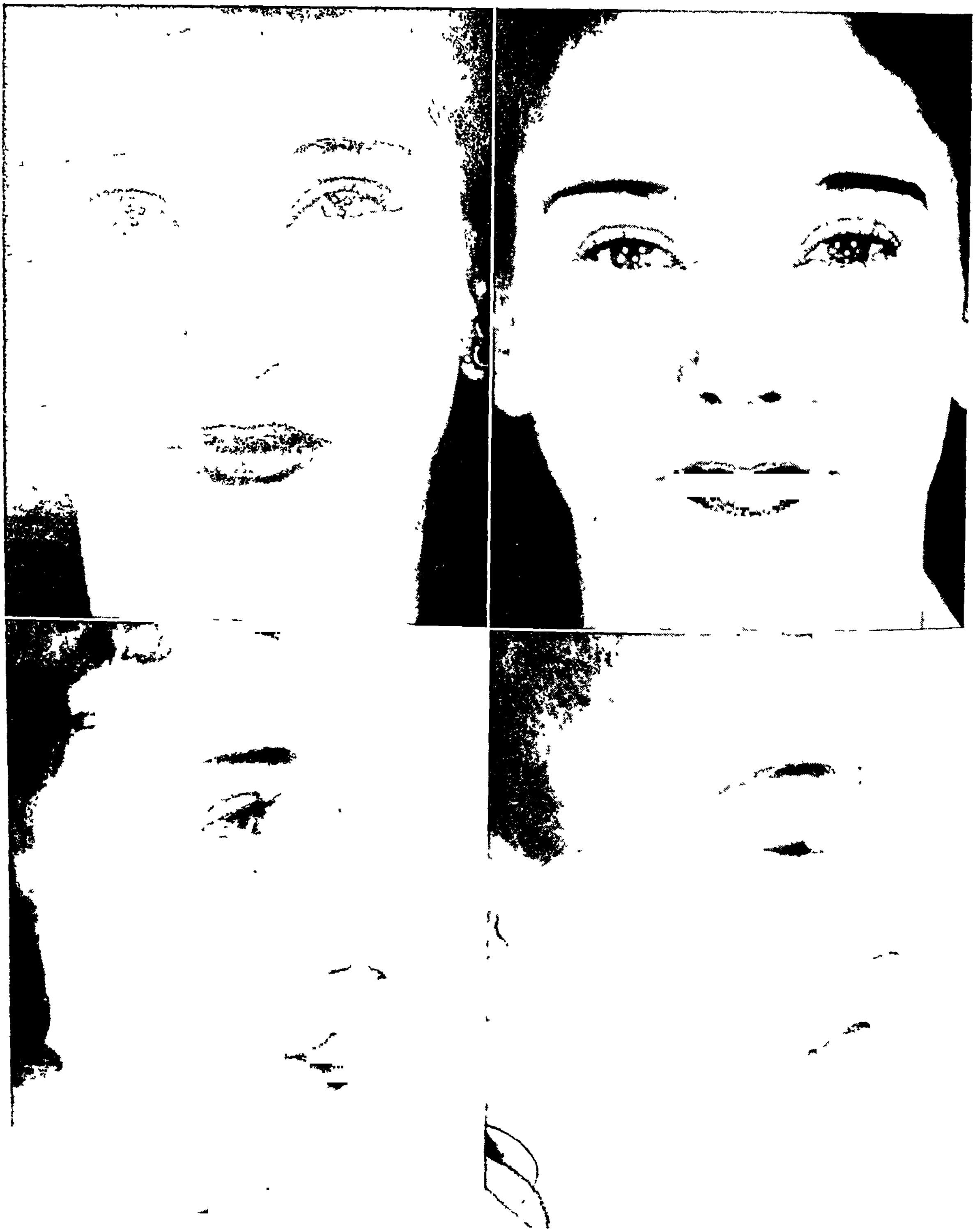

Fig. 3 Arriba, vista frontal de nariz encorvada y alargada, y depues de la correccion quiruriga. Notese como al disminuir la dimension vertical de la nariz le ha proporcionado armonia artistica y juventud a la cara. Observese ademas como los ojos lucen mas grandes. Abajo, nariz alargada y encorvada, y depues de la correccion quirurgica.

Tratamiento del Prolapso Uterino: Ventrofijacion

ERNESTO S. ROJAS, M.D
MEXICO, D. F.

ENGLISH SUMMARY

The author describes in detail his surgical treatment of uterine prolapse by ventrofixation of the uterus. He advocates the fixation, by suturing, of the posterior wall of the isthmus of the uterus to the anterior abdominal wall, and the shortening of the round ligaments by suturing them to each other ventral to the rectus sheath. He also advocates a perineorrhaphy in cases of extreme prolapse to cure the persistent lowgrade chronic infection of the genital tract.

ENTRE los problemes ginecológicos de mas difícil resolución, debe contarse el tratamiento quirúrgico de los prolapsos genitales. Basta para demostrarlo el sinnúmero de operaciones que se han ideado, y eso mismo confirma los pocos éxitos tardíos que se obtienen.

Siendo un tema tan extenso y teniendo muy en cuenta, por otra parte, la indiscutible competencia médica del culto auditorio aquí presente, omito muchos detalles y tan sólo enumeraré los indispensables que sirvan de fundamento al tratamiento que propongo; y me referiré solamente al prolapso de la matriz, porque es el órgano que arrastra a los demás.

El útero está por una parte suspendido, y por la otra sostenido. Esta hace que se dividan en dos grandes grupos las intervenciones quirúrgicas para su tratamiento.

Las intervenciones vaginales, desde la simple colporrafia, hasta la colpocleisis, pasando por las grandes perineorrafias y el Shauta, no las tendré en cuenta porque me referiré tan sólo a la ventrofijación.

Dos condiciones se necesitan para que se efectúe el prolapso de la matriz: sea la primera una marcada retroversión. He visto, por ejemplo, varios casos de señoritas que han perdido su himen por la salida de la matriz debida a una retroversión antigua, de tal modo, que en el procedimiento de Shauta se evita el prolapso efectuando una anteversión forzada y el autor del procedimiento ni siquiera completaba su perineorrafia. El otro elemento que favorece el prolapso del útero es la insuficiencia perineal, pero yo creo que esta insuficiencia es secundaria para la producción del fenómeno, demostrándolo el mismo Shauta con su intervención.

Meditando acerca de estos detalles y con los fracasos tardíos de la múltiples intervenciones que pratiqué, llegué a la conclusión de que, para obtener un buen resultado, tratándose de ventrofijación, es indispensable, por una parte, que la sutura a la pared sea muy sólida y segundo, que se haga una anteversión forzada.

El procedimiento que en la actualidad sigo y cuyos buenos resultados he podido apreciar, hasta después de diez años de la intervención, consiste en lo siguiente:

Hago una laparotomía suprapúbica, empezando la incisión unos seis centímetros arriba del pubis hasta el ombligo (esta incisión siempre la hago con cuchillo eléctrico). Siguiendo la técnica usual abro hasta el peritoneo (naturalmente, la enferma en Trendelenburg), meto la mano para tomar la matriz con un buen histerolabo, procurando no maltratar al órgano y lo llevo hacia arriba. Enseguida, despegando el tejido celular de la aponeurosis, perforo ésta y toda la capa abdominal con unas pinzas cerradas; tomo el ligamento redondo y lo saco por el ojal de la aponeurosis y, provisionalmente, fijo ese ligamento con unas pinzas de campo, sin perforarlo para qua no se maltrate. Idéntica maniobra hago del otro lado. Despúes, punto muy importante, paso hilos al través de la cara posterior del cuello, más bien en el límite del istmo con el cuerpo de la matriz. Estos hilos, tomándolos con aguja de Reverdin, los hago pasar de dentro afuera desde el peritoneo hasta el tejido celular subcutáneo, atravesando, naturalmente, la aponeurosis. Pongo la vacuna anticolibacilar (que siempre uso), dentro de la cavidad peritoneal y cierro la pared del vientre como en cualquier laparotomía. En seguida, anudo fuertemente los

A propósito de la Gastrectomía Total

HERNANDO ANZOLA CUBIDES *
BOGOTÁ, COLOMBIA

La gastrectomía total consiste en la extirpación radical del estómago, abarcando desde el cardias hasta el píloro sin dejar huellas de tejido gástrica, parte esencial que la diferencia con la gastrectomía subtotal.

Las razones que existen en esta diferencia tienen su fundamento en estudios experimentales y cuya síntesis citaremos en seguida:

1. En animales de experimentación, después de ejecutada una gastrectomía extensa, la pequeña porción del estómago restante aumenta progresivamente de volumen hasta llegar a un tamaño casi normal por un proceso de distención mecánica en el esqueleto conjuntivo muscular del órgano (Mann).

2. Cuando la lesión no se ha extendido hasta el cardias, y es posible dejar una parte aun muy pequeña, los riesgos operatorios disminuyen, y la supervivencia es mayor.

INDICACIONES

Anteriomente los pacientes con lesiones graves del estómago no alcanzaban los beneficios de la gastrectomía total por el alto porcentaje de mortalidad de esta intervención. Actualmente se puede decir que existe un buen margen de seguridad.

La gastrectomía total, como único procedimiento operatorio en casos de degeneración maligna extensa del estómago no significa sino un medio paliativo. Los controles en enfermos operados después de un cierto tiempo solamente han favorecido un 60 por ciento de los operados.

En el cáncer esquirroso, lo mismo que en pequeñas carcinomas incipientes de localización alta, en úlceras gastrocias de la parte vertical de la pequeña curva con síntomas de degeneración neoplásica la Gastrectomía Total se justifica. En estos casos hemos intervenido.

CONDICIONES PARA REALIZAR UNA GASTRECTOMÍA TOTAL

1. Un estado general del paciente que permita considerar la posibilidad de resitencia y la indicación de la intervención.

2. La ausencia de metastasis o nódulos neoplasicos en el hígado.

3. Que la porción última del esófago esté libre. Una inmovilidad de este sector impide la anastomosis esófago yeyunal.

TÉCNICA

Hemos practicado siempre la anastomosis anterior, dejando un asa aferente bastante libre para evitar tracciones sobre la boca anastomotica, no se ha practicado en ningún caso la entero-eterostomía complementaria, y siempre se ha tenido cuidado en hacer puntos de sutura separados y los ángulos de la boca se han fijado al sector fibroso del difragma.

CASOS

1. Enfermo operado el 14 de enero de 1943 —Hospital de San José Bogotá—Paciente de 48 años. Fué operado para una úlcera-cancerificada, con infiltración de las paredes, como puede verse en las fotografías, y en la placa radiográfica correspondiente. El control *radiológico que presentamos fué hecho* a los dos años de practicada la intervención.

2. Enfermo operado el 19 de agosto de 1944 —Hospital San José—Paciente de 60 años. Operado para úlcera alta de la pequeña curvatura con infiltración de las partes adyacentes. Control radiológico de las 9 semanas de practicada la intervención.

3. Enfermo operado el 6 de septiembre de 1944—Hospital de San José—Paciente de 46 años operado para carcinoma. Control radiológico a las 8 semanas de practicada la intervención.—Posteriormente fué controlado al cabo de nueve meses, y al cabo del año y dos meses ingresó de nuevo al hospital con metastasis hepáticas y allí falleció.

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* De la Facultad de Medicina de Bogotá, Colombia.

4. Enfermo operado el 28 de diciembre de 1944—Hospital de San José—Paciente operado para úlcera estenosante del bulbo duodenal y úlcera infiltrante de la parte alta de la pequeña curvatura, con un sindrome doloroso muy agudo. Control de las doce semanas de practicada la intervención y posteriormente a los seis meses.

ESTADISTICA

Han sido operados de gastrectomía Total en nuestro servicio de Gastroenterologia del Hospital de San José, siete pacientes, y de los cuales han sobrevivido hasta la fecha 4.

COMENTARIOS

Enfermos de lesiones graves del estómago pueden beneficiarse por medio de la gastrectomía total.

Puede pensarse con buenas razones que la gastrectomía total practicada en pacientes cuya lesión gástrica ha sido diagnosticada precozmente está justificada.

Las úlceras gástricas con síntomas degenerativos, muy dolorosas o hemorrágicas, situadas en la primera porción de la pequeña curvatura justifican la gastrectomía, pues el índice de mortalidad en estos casos es en mucho inferior a la gastrectomía total para carcinoma.

Editorials

Ten Commandments for Surgery in Obesity

WHEN the first operation on the obese was performed seems to be a deep secret since there is no record of it anywhere. But Doctor Finney of Johns Hopkins, whom I have had the pleasure of knowing, at the turn of the century reported that he had removed about fifteen pounds of fat from a pendulous abdomen. Since then such operations have been performed many times, but here we are concerned only with operations on obese persons for reasons other than the removal of fat.

Adam and Eve may or may not have been obese. Since they knew nothing of calories and vitamins, I take it they were very healthy and normally nourished people. Had they been fat, they could not have covered their nakedness with fig leaves, since fig leaves of those days must have been even smaller than they are at present.

The first operation on any human being ever performed was on the first man, this same Adam. The book of Genesis says: "God caused a deep sleep to fall upon the man, and he slept; and He took one of his ribs, and closed up the flesh instead thereof. . . ."

From this simple statement I gather that Adam was not an obese man, otherwise the author would have made some remark about the seriousness of the operation and the difficulty experienced in closing the incision.

Coming down to practical considerations, I have ten commandments in regard to surgery in the obese, even though my name is not Moses nor are my commandments written on a slate which could be so easily broken.

1. Thou shalt not undertake surgery on any obese patient if you have no patience, fear of God and fat, since you will meet many technical difficulties: oozing may be profuse throughout surgery; you may have to work in a deep hole; your instruments may be too short for comfort; and the closure may be almost impossible to achieve.

2. Thou shalt not give just any kind of anesthesia to your obese patient, since in him the induction and maintenance of general anesthesia is more difficult. His short thick neck makes the extension of the head almost impossible. The time of surgery being longer, the narcosis must be kept up longer, and yet he is the one in whom narcosis should be shorter since his cardiovascular system is often damaged and vital capacity decreased. If you use local anesthetics, they may cause necrosis and infection because of the poor blood supply. Despite this, you must use more of your local anesthetic since his local response is poor. Parenteral anesthetics have their drawbacks, too, in his case. The dose may be calculated too high on a weight ratio basis, with disastrous results. Probably spinal anesthesia is safest in him, though you may encounter difficulties in getting into his spinal column because of the excessive adipose tissue which he carries on his back.

3. Thou shalt not bury sutures in adipose tissue, especially chromic catgut and silk, if you do not want a breaking down of your incision and prolonged drainage. Stay sutures may save you from this embarrassment. Wire sutures are excellent material in his case.

4. Thou shalt not operate on an obese patient for any abdominal condition without an unusually meticulous examination. Fat may obscure tenderness and muscle rigidity. Thick chunks of omentum may be mistaken for a tumor or abscess, while deep-seated tumors may be missed.

5. Thou shalt not operate on an obese patient in a hurry. His metabolism must be brought under proper control. It may even become necessary for you to institute thyroid therapy to maintain a more active circulation. His cardiac and respiratory reserve must be increased, since fifty pounds of extra weight would require fifty miles of extra blood vessels, plus additional work for a heart which is already embarrassed by excessive pericardial fat and upward pressure on the diaphragm by a fat-laden peritoneal cavity. Incipient nephritis, liver and cardiac insuf-

ficiency must be corrected. His blood chemistry must be studied. His blood protein and vitamin A and C content should be brought to a higher level to augment rapid healing and recovery. In doing these things you may be accused of owning clinical laboratories, meat packing plants and orange groves in Southern California.

6. If thou desirest to reduce his weight prior to surgery, you should not starve him in a matter of fact way as you may bring on a preoperative acidosis and also deprive yourself of tissues needed for closure of the wound since his rectus muscles are already diastatic and inadequate. Preoperatively he may need intravenous glucose if he has recently been on a reduction diet unless his blood sugar is well over 175 mg.

7. Thou shalt not strictly confine your obese patient to bed after surgery. Despite his weight, he has to be turned in bed more frequently and made ambulatory much earlier since he is more prone to acidosis, abdominal distention, peritonitis, pneumonia and pulmonary embolism.

8. Thou shalt not forget that nursing care is more valuable and necessary in his case and that your nurses need your sympathy since it is not an easy task to turn over or lift 250 to 400 pounds of jellylike humanity.

9. Thou shalt not forget that your obese patient needs to be guarded more carefully against exposure and changes in temperature and humidity in operating rooms and wards. On a hot day he may suffer a heat stroke in the operating room right before your eyes before you know it, because of greater loss of fluids and salts than occurs in any other patient.

10. Once thou hast agreed to operate on an obese patient, thou shalt not have any other thought but the saving of him despite himself. He has been digging his grave by his teeth and appetite, even though all his life he has been complaining of starvation. It is up to you to save him from this grave by proper preoperative and postoperative care. Otherwise his friends may ascribe his deeds to you and say, "You dug his grave for him."

S. H. BABINGTON

National Health Service*

WHEN I was a medical student I studied for a short period at Rigshospitalet, Copenhagen (Fig. 1). As a consequence, throughout my professional life I have yearned for a State hospital system akin to that of Denmark. My New Zealand postgraduate students tell me that on the whole they and their colleagues are not displeased with their State medicine. I must also record that I have long held the belief that medical students should press for a co-ordinated system of medical education, with one portal of entry to the profession—M.B. or M.D. Britain.

With equal, nay, greater conviction, I feel [illegible] contemplating entering a national service under the proposed system, every medical student should make arrangements through his Dean to be conducted around the Ministry of Health. There (except during the lunch hour, 12 to 3), in its labyrinth of offices, he will come face to face with the very gentlemen who served Mr. Willink so faithfully (Fig. 2).† He will see each and all, from youthful clerk to knighted departmental chief, signing beneath their motto, "I am, Sir, your obedient servant." He should observe closely their well-known "Passed-to-you" technic and, particularly, he should request to meet that "Double First" who can trans-

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* [illegible] *British Medical Students* [illegible]

† Rt. Hon. Henry Urmston Willink, K.C., M.P., Croydon, North Division, Minister of Health, 1943–45. Reported to have visited St. Bartholomew's Hospital Medical School in company with Dr. H. Morley Fletcher in 1918 or 1919.

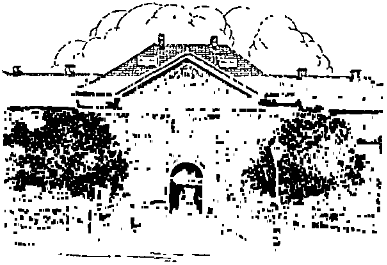

Fig. 1. The entrance to the (state-maintained) Rigshospitalet, Copenhagen. This Hospital may well be taken as a model for the reformation of British Teaching Hospitals.

Fig. 2. The small pile on the right is last week's prepaid telegrams awaiting reply. The pile on the left *concerns the admission of surgical emergencies, and is* somewhat larger than usual owing to midsummer recess. Much of this correspondence, we are told, would be avoided if the medical profession could understand the Ministry's memoranda.

late into English the Ministry's memoranda, for this person is unique (Fig. 3). He should tarry awhile in the form-*filling* (Fig. 4) and form-*filing* (Fig. 5) departments for, if he decides in favor of the proposed system, the greater part of his professional life will be spent in this absorbing work.

> *Paragraph 3 (d) taken from Circular 2176 issued by the Ministry of Health*
>
> "Where a consultant or specialist normally visits a Cottage Hospital whenever there are cases requiring treatment within his specialty, his remuneration should be derived from the medical staff fund constituted by the capitation fees, but where this is not the case and he is summoned *ad hoc*, he will be eligible for a sessional fee."

Fig. 3. An example of a memorandum of the Ministry of Health. Trained specialist lawyers were unable to define its meaning.

As he passes from office to office and from department to department he should dwell upon the fact that, right here before him, are the geniuses who, by sheer coordinated administrative prowess extending over more than twenty years, have succeeded in making the Tuberculosis Service what it is. At this juncture I should advise the student to seek refreshment lest, perchance, he becomes overwhelmed.

As he retraces his steps toward the exit

Fig. 4. The ability to select the approp[illegible] form and to fill it in correctly is regarded as a[illegible]ryday accomplishment by some of the higher offi[illegible]s of the *form-filling* department. To these maste[illegible]hnicians, trained from adolescence at the Ministry [illegible]ny of the *forms are intelligible.*

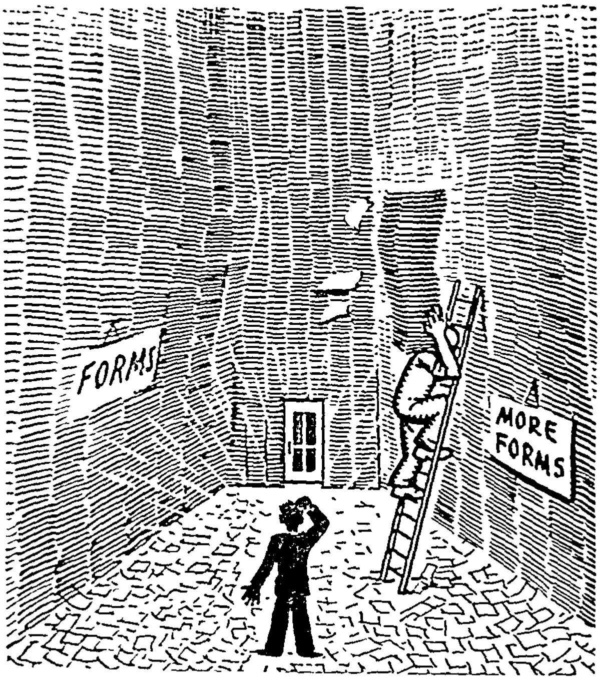

Fig. 5. A corner of the form-*filing* department. Presumably, in due course this collected material will be available for vital statistics.

through this hive of super-executives (the like of which he has never seen before) a golden opportunity lies before him. He can single out and observe intently those great chiefs whom Mr. Aneurin Bevan [1] proposes to invest with powers to withhold your right and my right to practice our profession. In contradistinction to members of the Plumbers' Union, and in spite of the protests of Dr. Morgan,[2] it is proposed that we are to be denied the rights of the Magna Charta (Fig. 6); instead, these gentlemen [3] are to be our judges.

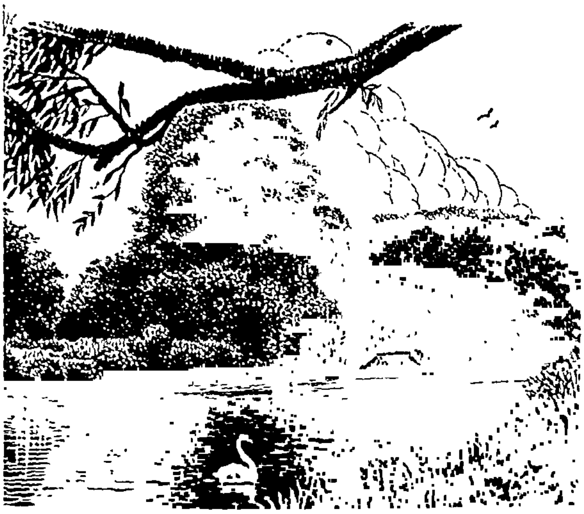

Fig. 6. Runnymede from the right bank of the River Thames. Apothecaries, barbers, physicians and surgeons have shared with members of other guilds, corporations, colleges and trade unions the legal emancipation granted by King John on June 15, 1215.

No, Sir, provided that scope is given for private enterprise, there is nothing fundamentally wrong with State medicine, but, if you knew as well as I know the officials of the Ministry of Health, I am sure that every nerve fiber in your body would cry out, "God forbid that they control me or my patients."

HAMILTON BAILEY

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[1] Rt. Hon. Aneurin Bevan, Contemporary Minister of Health. Believed to have visited a sick friend in Ebbw Vale Hospital in 1928.

[2] Hyacinth Bernard Wenceslaus Morgan, M.D. (Glas.), M.P., Rochdale. Consulting Physician, Trades Union General Council.

[3] Data concerning Mr. Bevan's and Mr. Willink's first-hand information of hospitals' and medical students' requirements have proved extremely difficult to obtain.

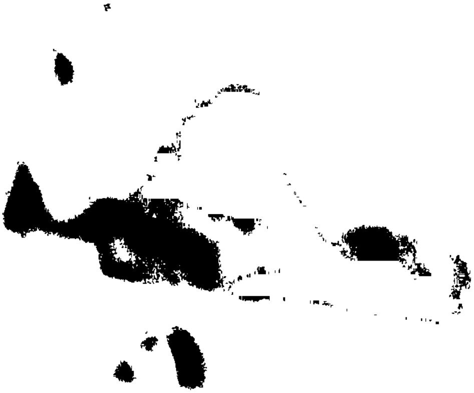

Fig. 5. A corner of the form-*filing* department. Presumably in due course this collected material will be available for vital statistics.

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qualifications. (2) Special training in midwifery and gynecology in an institution of repute and adequate teaching experience. (3) Experience of research work is considered an additional qualification. The age limit of not more than 46 years as of January 1, 1948, is relaxable for those who have special experience or outstanding qualifications. Pay is Rs. 800–50–1500 p.m., plus Rs. 150/–p.m.* as duty allowance for Medical Superintendent, Lady Willingdon Hospital. Initial pay in this scale may be fixed according to age, qualifications and experience. Advantage of Contributory Provident Fund admissible. Overseas pay at £/20– to £30/–p.m. and advantage of passage for non-Asiatics will also be admissible. Consultant practice allowed subject to right of Government to stop it in insurance of general policy. Applications should be made immediately to the Pakistan Embassy, Washington, D. C.

Applications are also invited for the permanent posts of (1) Professor of Anatomy; (2) Professor of Pharmacology and (3) Professor of Pathology and Bacteriology to West Punjab Government at the King Edward Medical College, Lahore, Pakistan. Candidates must possess high postgraduate qualifications in the branches concerned, capacity to organize, direct and conduct research work, considerable experience in teaching, and knowledge of English. They must be not more than 45 years of age as of Dec. 31, 1947, but these limitations will be waived for those with special experience or outstanding qualifications. Pay is Rs. 800–50–1500 p.m., initial pay according to age, qualification and experience, plus overseas pay of £25–30 p.m. Applications for these posts should be sent *at once to the Pakistan Embassy in Washington, D. C.*

For details as to dental appointments available address inquiries to the Pakistan Embassy, Washington, D. C.

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* Exchange rates: 1 dollar=Rupees 3 Annas 5 (1 Rupee=16 Annas).

of the Society of Orthopedics and Traumatology of the Red Rose of Merida, Mexico.

At the meeting of the International Congress of Ophthalmology recently held in Havana the following were elected corresponding members of the Cuban Society of Ophthalmologists: Raul A. Chavira. Antonio Torres Estrada, Carlos Malabehar Pena. Feliciano Palomino Dena, Teodulo Agundis, Jr., Enrique Graue, Jr., and Daniel Silva. Professors Chavira and Torres are President and Vice-President, respectively, of the Mexican Chapter, International College of Surgeons, and the others mentioned are members of this body.

Professor Ricardo Labardini Nave, F.I.C.S., has been appointed Director General of Health, and Professor Francisco Fonseca, F.I.C.S., Director of the General Hospital of Mexico respectively.

Professor Alejandro Ceballos, Hon.F.I.C.S., Argentine Chapter of the I.C.S., was elected Rector of the Free University of Buenos Aires, a recently established institution.

Professor Oscar Ivanissevich, F.I.C.S.(Hon.), Ambassador to the United States, has been appointed Minister of Public Instruction in Argentina.

The Hungarian Medical Trade Union will add celebration of its own to the commemorative ceremonies being planned for the centennary celebration of the Hungarian War of Liberty. To this end it is planning a Medical Week from September 4 to 12, 1948. The Hungarian Medical Trade Union invites members of the profession from foreign countries.

A communication from the President and the Secretary of this scientific body makes it clear that although every effort will be made to send information to persons and insitutions all over the world, a great part of the addresses was destroyed in the war years. Therefore the only way of reaching many is through notices such as this in medical journals and through this formal channel it extends its invitation to all members of the profession.

Secretaries. "Surgery of Inguinal Hernia" will be presented by Professor Guillermo Gastañata, F.I.C.S.; "Management of Injuries in Peru," by Prof. Fortunato Quesada, F.I.C.S., and "Treatment of Pulmonary Abscesses," by Dr. Carlos Peschiera. In addition, there will be other program features, including conferences and surgical sessions.

The Société Belge de Gastro-Enterologie held a meeting in Brussels on January 31, 1948, at which papers were presented by Doctors J. Lederer, De Rom, Crousse and De Witte, Remouchamps, Verdoodt and Parmentier, Massion, and Crousse, Stoupel, Thiebaut and Van Diest.

A new exercise in medical cooperation between separate nations and a venture that is unique in surgical publications is presented by the agreement reached at the London Conference held in the Royal College of Surgeons, in May 1947, between representatives of the British and the American *Orthopaedic Associations*. *This* agreement becomes reality in the new *Journal of Bone and Joint Surgery* which will be shared equally by the Nations of the British Commonwealth and the United States of America. Each nation has set up its own Editorial Board and the representative issues will be edited by the respective staffs. The journal is the official publication of the American Orthopaedic Association, British Orthopaedic Association, Australian Orthopaedic Association, Canadian Orthopaedic Association, American Academy of Orthopaedic Surgeons. Applauded by New Zealand and the Union of South Africa, the journal is to be published every six weeks, some issues in London, some in the United States. Direction is by an Editorial Board of 32 members, 16 of which are American and 16 representing the members of the British Commonwealth of Nations. The first issue was February, 1948. Continued developments will be watched with interest.

Notification has been received of vacancies in medical appointments in Pakistan. Applications are invited for the posts of Professor of Midwifery and Gynaecology, King Edward Medical College, and Medical Superintendent, Lady Willingdon Hospital, both of Lahore, Pakistan. There is no restriction of nationality or domicile but applicants must be able to teach the subjects in English. Persons of non-Asiatic domicile will be appointed on 5 years contract. Candidates must possess, (1) M.R.C.O.S. (London) with postgraduate surgical qualifications F.R.C.S. (England) or M.S. of the British Universities, or equivalent or higher

SOURCE BOOK OF ORTHOPAEDICS. By Edgar M. Bick, Ed. 2, Baltimore, The Williams & Wilkins Company, *1948, 540 pp. This very interesting book should be read by every orthopedic surgeon.* For those surgeons who desire to know *who did what first* the book contains excellent information. It is extremely abundant in its biographies and in its index. It has been completely rewritten from cover to cover and contains more additional information than the first edition. Many illustrations have been added which makes it more interesting reading than the first edition.

DISABILITY EVALUATION: PRINCIPLES OF TREATMENT OF COMPENSABLE INJURIES. By Earl D. McBride, Ed. 4, Philadelphia, J. B. Lippincott Co., 1948. The contents are divided into 36 chapters and provided with an excellent index and bibliography. The careful system utilized by the author for evaluating disabilities is clearly explained and there are many charts illustrating his evaluations on almost every conceivable type of case. This book should be in the library of every orthopedic surgeon or industrial surgeon. It would be worth its weight in gold to the claim adjuster of insurance companies. It should be on the shelf of every personnel manager of every large corporation. I know of no other book that deals with this subject, which contains anywhere near the volume of valuable information that can be found in this new fourth edition of Dr McBride's.

CLINICAL RADIOLOGY. A CORRELATION OF CLINICAL AND ROENTGENOLOGICAL FINDINGS. Edited by Captain George Utley Pillmore, MC(S), USNR, Philadelphia, F. A. Davis Co., 1946, 2 vols., 708 pp., 2484 illustrations. This excellent work is the result of the collaboration of an impressive group of 58 contributors. The editor states that the purpose of the work is to present applied radiology in a clinical manner, stating that the "mere description of shadows . . . is a thing of the past." While the two volumes aim at diagnosis an important secondary aim is medical and surgical treatment. These two volumes, excellently arranged and lavishly illustrated, would seem to be invaluable to roentgenologists, internists and surgeons, and should find a place in every hospital library.

ESSENTIALS OF OBSTETRICS AND GYNECOLOGY. By William Albert Scott and H. Brookfield Van Wyck, Philadelphia, Lea & Febiger, 1946. In this comparatively small book the authors discuss the fundamentals of obstetrics and gynecology. Some subjects, however, have been given too slight consideration. For example, seven pages and six illustrations are given over to congenital abnormalities which are uncommon, whereas only one page is devoted to the menopause and three and a half pages to the subject of sterility. In the chapter on "Pathological Conditions of the Vagina" only one sentence is devoted to mycoses and nothing is said of the symptomatology, diagnosis or treatment of this condition which is not uncommon. There is no chapter on endocrinology, but there are excellent chapters on conditions where the endocrine glands play a predominant role as in menstrual disturbances and sterility.

Aside from these and other minor inequities in the allotment of space, the authors are to be complimented on the way they have covered the important facts about obstetrics and gynecology. The first 50 pages are devoted to the anatomy and physiology of the female genital tract, the next 180 pages take up normal obstetrics, abnormal obstetrics and operative obstetrics, and the remainder of the book is devoted to gynecology.

In their recommendations covering treatment the authors are conservative in accord with the *teaching and practice of nearly all the leading obstetricians and gynecologists.*

The book is very well written and the type is clear, hence reading it is easy. The illustrations are abundant. The drawings are beautiful and instructive, and the photographs are clearly reproduced. Both the authors and the publisher have done their job well. The book should prove highly useful to students and practitioners as a supplement to the large textbooks which deal with obstetrics and gynecology.

PRIVATE ENTERPRISE OR GOVERNMENT IN MEDICINE. By Louis Hopewell Bauer, Springfield, Ill., Charles C Thomas, 1947. This book gives a wealth of background on government medical legislation abroad, from which the reader can draw his own conclusions. The author carefully reviews all attempts in medical socialization by social reformers in this country. Compulsory insurance in this country is backed by the Committee on Research for Medical Economics with Michael M. Davis,

NEW BOOKS

Diseases of the Gallbladder and Allied Structures. By Moses Behrend, Philadelphia, F. A. Davis Co., 1947. If for no other reason—though there are many others—this book should be in every general surgeon's library because it presents extraordinarily detailed descriptions and illustrations of anomalies of the bile passages and blood supply. Every surgeon who has performed a number of cholecystectomies is aware of the startling way the unexpected may be opened to his view and the hazards inherent in assuming that the anatomic relations will be found normal. No less than 48 highly detailed illustrations are devoted to this vexing problem of aberrant vessels and anomalous ducts. The surgeon will be grateful to have them all in one book where he can study them at leisure, instead of being obliged to leaf through a number of texts.

Every aspect of gallbladder surgery is taken up with studious care, special emphasis being given to some. For instance, the uselessness of cholecystostomy is stressed, the procedure being classified as meddlesome surgery in chronic cholecystitis since it rarely circumvents a second operation. The author's meticulous technic of open operation in a practically bloodless field is fully described and illustrated step by step and does credit to his surgical acumen and skill. His method of nondrainage in selected cases is noteworthy.

The author's forty-five years of surgical experience are readily discernible in every chapter of this admirable book, and everything new in management and therapy can be found here if it is clinically acceptable. A particular merit is the conciseness of the writing which will be appreciated by the busy surgeon.

It is to be hoped that so excellent an anatomist, especially in the field of biliary surgery, might be persuaded to devote study to the sphincter of Oddi, regarding which reference in technical works always is vague and casual, and give the surgical world the benefit of such definitive research. The problem of biliary dyskinesia, too, seems to be growing instead of having been solved.

Oversights, such as the spelling of Levine instead of the correct Levin, when weighed against the intrinsic value of the work as a whole, are of minor consequence. This book can be highly recommended.

The Appendix. By R. J. Love, London, H. K. Lewis & Co., 1947. Bearing in mind the sage of Ecclesiastes who said, "Of the making of books there is no end, and much study is a weariness of the flesh," the author has studiously avoided redundancies and theorizing, aiming to produce a book that was concise, well written, in which a subject could be quickly and easily found, and which focused upon the practical aspects of the subject. He has succeeded admirably.

It is surprising how much concentrated information can be bound between the covers of so small a book—pocket size, 181 pages—and the demonstration might with profit be studied by those who bring out wordier tomes of greater poundage without adding materially to the content. The author's expressed hope that the little manual might prove to be of use to younger surgeons upon whose shoulders falls the responsibility of emergency work should not be a vain one.

In this admirable little book are succinctly discussed the usual aspects of the subject (history, anatomy, diagnosis, differential diagnosis, appendectomy, postoperative complications, etc.) in an unusual way, and some more unusual approaches, such as Treatment of the Appendix Mass, General Peritonitis, Appendicostomy, Less Common Diseases of the Appendix, and Obstetrical and Gynecological Considerations, have been added and developed in an original manner.

Here within small compass is all the information, and more, one could gather from a dozen works on general surgery, from each of which one would have to glean the bits to put together as a whole. This little book cannot be too highly recommended. The only criticism one might offer applies to the publisher rather than the author. The editors should have been more alert to catch such oversights as the appendicectomy where appendicostomy was meant, carbohydrated diet where carbohydrate was intended and similar errors for which editors properly are responsible. But even such oversights cannot mar the intrinsic merit of this little contribution to surgery.

Osteotomy of Long Bones. By Henry Milch. Springfield, Ill., Charles C Thomas, 1947, 294 pp. Orthopedic surgeons will welcome this little book by Dr. Milch which confines itself to a discussion of osteotomy as one of the simplest and most useful of all methods developed for the treatment of skeletal deformity and disability. The book is well printed and arranged and adequately illustrated.

The twelfth edition of **Practical Physiological Chemistry**[1] is a complete revision of the subject matter of the book. Many chapters have been entirely rewritten, all of them have been reexamined to insure their application to present-day knowledge, and the clinical and theoretical phases have been strengthened. New sections have been added, such as those on the polarograph; isotopes; sulfa drugs; metabolic antagonists and antibiotics; the Warburg tissue-slice procedure; theory and practice of photometric analysis; electrophoretic fractionation of the plasma proteins; composition of foods; and on the various vitamins whose importance has become recognized since the last edition, together with the clinical relationships of certain of them. Many new quantitative procedures for blood and urine analysis have been added.

Particular attention has been paid to the illustrations; some were redrawn and many new ones were added. The book remains the standard classic of its field.

Sir Alexander Fleming[2] has ably covered the subject of penicillin therapy from all possible angles. This book is an authoritative treatise, which should be a guide for both the general practitioner and the specialist.

The book expresses the views of each independent contributor, and as such reveals some interesting variations in opinions expressed. The following contributors are included:

A L Bacharach, M.A., F.R.I.C.
B. A. Hems, Ph.D., F.R.I.C.
H. Berry, B.Sc., Ph.C., Dip. Bact. Lond., F.R.I.C.
L. P. Garrod, M.D., F.R.C.P.
W. Howard Hughes, M.D., B.S.
A. E. Porritt, C.B.E., M.Ch., F.R.C.S.
G. A. G. Mitchell, O.B.E., M.B., Ch.M.
R. Vaughan Hudson, F.R.C.S.
Ronald V. Christie, M.D., D.Sc., F.R.C.P.
A. Hope Gosse, M.D., F.R.C.P.
T. Holmes Sellors, D.M., M.Ch., F.R.C.S.
Rainsford Mowlem, F.R.C.S.
V. H. Ellis, F.R.C.S.
Ian Aird, Ch.M., F.R.C.S. ed.
E. C. B. Butler, F.R.C.S.
R. M. Handfield-Jones, M.S., F.R.C.S.
Leslie Williams, M.D., M.S., F.R.C.S., F.R.C.O.G.
Donald Paterson, M.D., F.R.C.P.
Martin Bodian, M.D. Vienna, L.R.C.P. & S.Ed.
A. Dickson Wright, M.S., F.R.C.S.
G. L. M. McElligott, M.R.C.S., L.R.C.P.
Arnold Sorsby, M.D., F.R.C.S.
John F. Simpson, F.R.C.S.
A. C. Roxburgh, M.D., F.R.C.P.
E. Wilfred Fish, M.D., D.D.Sc., D.Sc.
Reginald Lovell, M.Sc., Ph.D., M.R.C.V.S., D.V.S.M.
G. B. Mitchell-Heggs, O.B.E., M.D., F.R.C.P.

These differences in opinions add, rather than detract from the merits of the book as a whole, indicating that the future may bring quite some experimentation concerning dosages and methods of administration; the fields of research are still open and drastic changes in indication, contraindication and administration of penicillin may be forthcoming.

The division of the book into a general and a clinical field is of advantage; for the research man, the first section will be of primary interest, to the general practitioner and specialist, the second section covers his fields. For full understanding of the subject, of course, both sections should be studied. This is furthermore one of the few, if not the only, book in which the more purely medical sections are closely combined with dental and veterinary surgery. It is a must for the practitioner's medical library.

In this profound study of the Surgical Anatomy of the Facial Nerve and the role of conservation of the facial nerve in total parotidectomy, **Dr. Vicente J. Bertola**[3] presents a most detailed and meticulous description of the anatomy of the course of the facial nerve. He follows the nerve

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[1] Practical Physiological Chemistry. Philip B. Hawk, Ph.D., President, Food Research Laboratories, Inc., Long Island City, New York; Bernard L. Oser, Ph.D., Director, Food Research Laboratories, Inc., Long Island City, New York; and William H. Summerson, Ph.D., Associate Professor of Biochemistry, Cornell University Medical College, New York City. 1323 pp., 329 illustrations plus color plates. The Blakiston Company, Philadelphia, 1947.

[2] Penicillin and Its Practical Application. Under the General Editorship of Professor Sir Alexander Fleming, M.B., B.S., F.R.C.P., F.R.C.S., F.R.S. 380 pp., 59 illustrations, many tables. The Blakiston Company, Philadelphia, 1946.

[3] Anatomia Quirurgica del Nervio Facial. Vicente J. Bertola, M.D. 271 pp., 104 illustrations. Imprenta de la Universidad Cordoba, Republica Argentina, 1947.

Ph.D., as chairman, which apparently is financed by the Rosenwald Foundation, the Albert and Mary Lasker Foundation, the Rockefeller Foundation, and private donors. The Committee's basic formula follows the International Labor Organization recommendation which is the establishment of chairs of socialized medicine in the medical schools and classification of physicians as skilled workers. Some of the witnesses before the senate committee favoring the Wagner-Murray-Dingell Bill were on the Federal payroll and had not even read the Bill, their statements having been prepared by the Federal Bureaus.

The author points out the failures of government medicine abroad and the deficiencies in government hospital administration in this country. The U. S. Government has 78 per cent of the total bed capacity, but only 39 per cent of the admissions. The people in this country spend on medical care $22.50 per person per year but on alcohol $37.50. What we need is not socialized medicine, as the author points out, but better medical education for the general public, protection against nostrums and quackery, improvement of economic standards of communities, preventive medicine for all, establishment of county health departments and care of the indigent by grants-in-aid. The low income groups would be cared for through such method as is provided in the Taft-Smith-Ball-Donnell Bill now before the Senate. And the rest of our people are and will be able to be taken care of through voluntary health insurance. There is urgent need of amalgamation into one agency of all government departments, bureaus and administrations dealing with health.

The more one reads the book the more he is convinced that the author deserves a great deal of credit for the magnificent way in which he handles such a difficult and controversial subject. It is remarkable how much factual, historical and legal information is packed in its 201 pages. Every physician or layman should read it. The appendix, the Taft-Smith-Ball-Donnell Bill (s545), should be studied by everyone interested in medical legislation.

MORELL MACKENZIE, THE STORY OF A VICTORIAN TRAGEDY. By R. Scott Stevenson, New York, Henry Schuman, 1947. Readers interested in medical history, especially when the subject has influenced the course of world history, will wish to acquire and read this book. It was Morell Mackenzie who was called to the Continent in consultation as to the nature of the laryngeal growth of Emperor Frederick III who reigned only ninety-nine days and, in dying, took with him the hopes of a liberal government in Germany and gave it instead Kaiser William II. The book is in the nature of a defense of the stand Mackenzie took against operation, based as it was on the limited medical knowledge and technical skills of the day. The author's defense is bolstered by extensive research among papers, letters, telegrams, and other sources hitherto not available. Regardless of one's own opinion of the interpretation, the book is worthwhile because of the completeness of historical background and source material.

AMIABLE AUTOCRAT, A BIOGRAPHY OF DR. OLIVER WENDELL HOLMES. By Eleanor M. Tilton, New York, Henry Schuman, 1947. To most literate Americans outside the world of medicine the physician is lost in the "Autocrat of the Breakfast Table." To medical men the man of letters is lost in the physician whose name is linked with the theory of the contagiousness of puerperal fever. The present book, completely documented, presents a picture not only of the physician and the writer but of the Boston Brahmin as well. Upon one point especially the thorough research by the author proves highly interesting. As a rule historians give Dr. Holmes (coincident with Semmelweis) credit for pointing out the contagiousness of puerperal fever and for suggesting that it is carried from bedside to bedside by physicians, midwives and nurses. Here it is made clear that before Dr. Holmes laid himself open to professional criticism and antagonism with this theory he had gathered records from the literature and other physicians. He found that "as early as 1773 Charles White of Manchester had concluded that puerperal fever is contagious and advised precautions," and that Robert Collins in 1835 reduced the mortality rate in a Dublin hospital by the use of disinfectants. It was the force of Holmes' presentation, supported by these collected facts, clothed in his eloquence and "informed by passionate indignation and unshakable conviction" that have had the ultimate result of crediting him with the original idea, losing in the background of history those who went before.

This book should be in the library of those interested not only in medical biographies but in many-faceted personalities as well. It is thoroughly documented, well written and illuminated by flashes of humor.

chemotherapy. The chapters on "Injuries of the Spine" and "Injuries in the Region of the Hip" have been revised and are especially complete.

In keeping with the conservative nature of the book, the section on external fixation is passed over briefly. Although the authors disapprove of external fixation in general, they conclude fairly that the external fixation devices are successful in the hands of those who have considerable skill in their use.

Such a book as the **Women in Industry,**[7] by **Anna M. Baetjer,** has a tendency to defy the usual attempts at review. Representing as it does the ultimate results of a formidable amount of study and research over a considerable length of time and in several different countries, the contained material is too vast and varied to be outlined or even indicated in the space usually allotted to such an effort.

Women have always worked in industry to a certain extent, especially during times of war. They have never done so as extensively, especially in the so-called "heavy industries," as during the war just ended. Up to the past five years, very little effort had ever been made to determine accurately just what effects such work had upon their health and well-being. Much was learned during these war years about many phases of this vast problem; much also remains to be learned. This book is an exhaustive compilation of most of the information obtained both in the United States and Britain. It is divided into some half dozen sections covering such general topics as the ability of women to work and suitable working conditions for them, sick-absenteeism, accidental injuries, occupational diseases, gynecological and obstetrical problems, menstruation, mortality and fertility. The final seventy-five pages are devoted to appended tables on occupation distribution, suitable occupations and labor laws affecting women. There is also a very complete bibliography of more than twenty pages and an extremely detailed index.

The appeal of such a volume is not wide, but to those to whom such problems are of practical importance, such as plant and industrial physicians, personnel managers, industrial plant superintendents and others who have occasion to employ women in any other occupations than the conventional "women's jobs" (teaching, nursing, domestic service and clerical work), it should prove extremely enlightening, informational and generally valuable as an authoritative work for reference.

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[7] Women in Industry; Their Health and Efficiency. Issued under the Auspices of the Division of Medical Sciences and the Division of Engineering and Industrial Research of the National Research Council. Prepared in the Army Industrial Hygiene Laboratory. Anna M. Baetjer, Sc D. 344 pp. W. B. Saunders Co, Philadelphia, Pa.; 1946.

from the outside in, beginning with superficial dissections and ending with exposure after the parotid gland has been removed, thus presenting all the various planes. The preparations used are excellent, and the superimposition of outline drawings of the nerve on tissue paper on photographs cf the corresponding anatomic preparation is most valuable for keeping in mind the various landmarks and branchings of the facial nerve. The 16 different anatomic preparations are of heads of different cephalic index, thereby well illustrating the varied findings in such different heads. Dr. Bertola describes various technics of parotidectomy and gives a detailed, step-by-step description of his personal technic, which does least damage to the facial nerve. The book is recommended as a most scholarly work.

This literary gem[4] is a transliteration, into modern language and analogy, of the book by the same title written in the seventeenth century by the Spanish Jesuit priest, Baltasar Gracian. Dr. Eisenschiml has added to the interpretation his own pungent wit and seasoned philosophy, with punch-lines which are like sharp thrusts of the scalpel.

For instance: ". . . generosity is wasted, if not accompanied by a heart felt desire to do good. Flavor your gifts with sympathy, and you will be loved, for hearts speak to other hearts in a language all their own, unintelligible to those who listen only to the jingle of coins. The names of philanthropists, engraved in marble memorials, soon lose their meaning, but the names of Florence Nightingale and Clara Barton will live forever in the annals of humanity."

Or: "Prince Metternich, Austria's greatest diplomat, had a simple formula for meeting difficult situations. 'Let us drink tea and wait.' He drank much tea; he also had a long and successful career."

Or: "The wittiest repartee is worthless after the party is over."

For relaxation and rich pleasure this book is highly recommended.

Based upon 100 unselected and consecutive personal cases of advanced abdominal cancer, **Dr. Brunschwig**[5] presents proof that the boundaries of operability can be extended to a far greater degree than has yet been attempted. Complete case histories were taken of these 100 patients, and a most thorough and careful follow-up study of each case was considered of primary importance. Operative mortality in the group was 34 per cent. Of the total group, 17 per cent received no relief from the surgical operations performed; 30 per cent received some palliation. The remaining 19 per cent survived for long periods following radical surgery, 13 patients being still alive and well with an average survival time of 40 months. Dr. Brunschwig states that his principal object was to gain some impression as to what might be accomplished by radical extension of operative surgery for the "inoperable." He concludes that the only limits to operative resection of intra-abdominal structures are the limitation afforded by the minimal requirements of certain structures for normal physiologic activity, viz., a portion of one adrenal, possibly 30 per cent of the small bowel, sufficient renal tissue for adequate urine secretion, etc.

The book is recommended to all thoughtful surgeons as a stimulant for new concepts of operability of advanced abdominal cancer, still one of the most common forms of cancer in man.

Fractures, Dislocations and Sprains,[6] by **Key** and **Conwell**, appears now in its fourth edition. This text cannot be excelled as an authoritative and practical guide for the student, general practitioner and surgeon. Fractures and orthopedic problems can be met with the confidence that the conservative and generally accepted form of treatment will be outlined in workable form. This edition brings you many new ideas in the management of compound fractures, in the use of penicillin and the various forms of

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[4] The Art of Worldly Wisdom. Otto Eisenschiml, LL.D., Duell, Sloan & Pearce, New York, 1946, 160 pp.

[5] Radical Surgery in Advanced Abdominal Cancer. Alexander Brunschwig, M.D. 324 pp., 118 illustrations. The University of Chicago Press, Chicago, 1947.

[6] The Management of Fractures, Dislocations and Sprains. John Albert Key, M.D., and H. Earle Conwell, M.D. C. V. Mosby Co., St. Louis, Mo.; 1946.

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ABSTRACTS OF CURRENT LITERATURE

Fatal Air Embolism During Mastectomy, C. Langdon Hewer and Herbert I. Coombs, Brit. M. J., Jan. 17, p. 97, 1948. Operation and anesthesia had proceeded without incident until the breast had been removed and dissection of axillary glands was taking place. Some hemorrhage took place from the axillary vein and a few minutes elapsed before a ligature was passed around the vein and tied. At the moment of ligation the patient gave a sharp inspiration and stopped breathing. Methods of resuscitation, at first apparently successful, eventually failed. Postmortem examination substantiated the clinical diagnosis of embolism as the cause of death, though none of the signs of embolism, particularly no hissing sound as air entered the vein, had been present. It is suggested that diagnosis of air embolism must often be missed unless a postmortem examination is carried out, and that even at necropsy it may be missed if not previously suspected, because of the small amount of air involved. In this case, after careful necropsy, death was ascribed to air embolism and fibrin formation in the right heart.

Endometriosis as a Cause of Intestinal Obstruction, P. McGuff, et al., Surg. Gynec. & Obst. 86:273, March, 1948. Sixteen cases of intestinal obstruction caused by endometriosis were studied. If the large bowel is involved, severe constipation, lower abdominal pain and distention are practically always present; if the obstruction is ileal, vomiting occurs, if colonic, obstipation is more frequently present. Menorrhagia and metrorrhagia occur as symptoms of associated pelvic disease rather than as symptoms of endometriosis. In diagnosis the clinical history, digital examination, sigmoidscopic examination and roentgenography of the colon and terminal portion of the ileum are important. When the lesion is in the lower bowel the two most important adjuncts in diagnosis are sigmoidoscopy, with the presence of an extrarectal mass and an intact puckered mucosa, and a roentgenogram of the colon with the presence of a long, inconstant filling defect with sharp regular borders and an intact mucosa. Endometriosis causing obstruction of the ileum presents a less characteristic clinical picture than that in the sigmoid and below. In the ileum the mechanism of obstruction was usually due to kinking caused by the endometriosis, while below it was more often due to impingement of the endometriosis upon the lumen of the bowel. Microscopically endometrial glands and stroma were found in all layers of the intestinal wall, and fibrosis around the endometrial glands and stroma was characteristic in all the sections.

Treatment is surgical. If the ileum is involved ileal resection is necessary, with or without preliminary ileostomy or panhysterectomy as indicated by the pelvic pathology. When the colon is involved, bilateral oophorectomy or panhysterectomy is sufficient in most instances. Prognosis is excellent and surgical mortality nil.

Closure of Colostomies, H. Haffner, and R. B. Lynn, Ann. Surg. 127:243, Feb., 1948. Experience with 72 consecutive colostomy closures by end-to-end anastomosis or a modification of the Pauchet technic, has resulted in a preference for the latter in transverse closure in descending and sigmoid colons. With this type of closure the withholding of food postoperatively is unnecessary, postoperative discomfort is minimal, early ambulation is accomplished, and wound infection, leakage or failure of closure, or obstructive symptoms is unknown in the experience of the authors. Briefly, the technic consisted in encircling the colostomy stoma by an elliptical skin incision, leaving a cuff of skin about ¼ inch around the mucosal edge. The incision is deepened in an anatomic manner by sharp dissection through all the layers of the abdominal wall down to the peritoneum which is opened along the medial aspect of the colostomy. The peritoneal incision is continued by sharp dissection so that it completely encircles and frees the afferent and efferent limbs of the colostomy. With gentle traction on the bowel, further mobilization is continued as far as is necessary to provide an adequate length of bowel for the anastomosis, and to permit, if necessary, resection of the colostomy or of segments of bowel deformed by secondary fistulas, extensive scarring or granulomatous masses. Proper mobilization permits complete delivery from the abdominal cavity of the afferent and efferent limbs of bowel to be used in the anastomosis. The wound edges and the peritoneal cavity are protected by two large saline packs tucked snugly down into the wound around the bowel. All subsequent surgical procedures are then carried on entirely outside the abdominal cavity and the operative wound. The anastomosis is completed after complicating conditions in the operative field have been corrected. Upon completion of the anastomosis the bowel is carefully replaced within the peritoneal cavity, so as to avoid kinking or twisting and the wound is closed in layers without drainage.

The Cytologic Method as an Aid in the Diagnosis of Gastric Carcinoma, Ruth Graham, et al., Surg. Gynec. & Obst. 86:257, Mar., 1948. The cytologic method may prove of value in bringing cancer of the stomach to operation earlier than in the past. By this method a fasting specimen of gastric secretion is obtained by aspiration, sent to the laboratory *immediately* since even a half hour's delay is sufficient to effect digestion of the cells, with loss of cellular characteristics. After immediate centrifugation the sediment is spread on a glass slide and fixed for 15 minutes in ethyl ether and 95 per cent alcohol. The slides are then stained by Papanicolau's method. By this method only 2 of 7 resectable cases were missed; one was a scirrhous carcinoma of the wall of the stomach. Such a tumor could not be expected to shed cells.

It is of fundamental significance that preinvasive carcinoma sheds cells which can be recognized as malignant. The greater accuracy of the cytologic method in early lesions may be due to the presence of active, healthy, malignant cells on the surface of such lesions. In gastric secretion the malignant cells often appear in groups, show hyperchromatic large nuclei with prominent nucleoli which may be vacuolated (in adenocarcinoma), and no sharp cellular borders.

Urologic Complications of Malignant Tumors of the Colon and Rectum. Giorgio Dodero, Bol. e Mem. Soc. Piemontese di Chir. 17:376, 1947.

The urologic complications of malignant disease of the colon and rectum occur between the ages of twenty and sixty. Man is more subject to this disease than women because in the latter the genital organs lie between the rectum and bladder.

The clinical aspect of such complications depends upon pressure from the tumor itself or from the inflammatory mass due to peri-tumoral infection around the growth. Any part of the urinary tree may be involved, but more frequently the bladder is involved, giving rise to polyuria, impaired micturition, strangury and dysuria. Anatomic alterations produce partial retention, pericystitis, cystitis, or intestinal vesicle fistula.

Invasion of the prostate may simulate a primary carcinoma of that gland, although more frequently it results in periprostatitis or prostatic abscess. The higher urinary tree can be damaged either by tumors of the ascending, transverse, or descending colon as well as by tumors of the sigmoid or rectum. High urinary tract involvement may cause periureteritis, ureteritis, pyelitis, pyelonephritis, perirenal abscess, or ureteral intestinal fistula.

The prognosis of these patients depends not only on the primary carcinoma but also on the complication of renal insufficiency.

If the diagnosis of the primary malignancy is made early, not only will surgery of the primary lesion be made possible but it will also be possible to repair the damaged urinary apparatus. If the diagnosis is made late, a suprapubic cystostomy is indicated, with treatment of the suppurative process.

Surgical Castration and Synthetic Estrogens in Carcinoma of the Prostate, Mario Bonino, Bol. e Mem. Soc. Piemontese di Chir. 17:369, 1947.

The author divided his cases of carcinoma of the prostate into two groups. The first group was treated by orchidectomy and high doses of synthetic estrogens, while the second group received estrogens alone. Good results were obtained in the first group: the masses in the prostate disappeared completely and the patients were able to urinate normally. Radiating pains disappeared and the general condition of the patient improved. Even the impotence improved, but metastases persisted.

Less evident results were obtained in the second group, even though less serious cases were treated by this method.

The author believes that in order to obtain good results the internal secretions must be suppressed and that it is unwise to depend on estrogens alone.

A New Penicillin for Prolonged Blood Levels, N. P. Sullivan, A. T. Symmes, H. C. Miller and H. W. Rhodehamel, Jr., Science, 107:169, Feb. 13, 1948. This study, which comes from the Lilly Research Laboratories, describes the developme
of a sparingly soluble penicillin
administered in oil, oil and
physiologic saline. This new
complex was produced by c
procaine with penicillin G. Th
a solubility of approximately
in the vehicle mentioned. They
than 90 per cent penicillin G,
940 units/mg. (1040 units/mg.
the oil suspension at least
total weight of the partic
length. The importance o
slow absorption of penicillin
strated by other workers. The
found that of 21 hospital patien
new penicillin in cottonseed
a blood level lower than 0

fourth hour. Many other patients showed levels of 0.124. One patient receiving 3 cc. (900,000 units) had a therapeutic blood level at the thirty-sixth hour and a second patient receiving 4 cc. (1,200,000 units) had a blood level of 0.124 at the forty-eighth hour. In none were there local or systemic reactions. Further studies are in progress.

Practical Considerations in the Treatment of Burns, Joshua M. Deaver and Eugene P. Cronkhite, Mil. Surgeon, **102**:120, Feb. 1948. Where it is impossible to maintain sterile operating conditions, and where it is not feasible to administer sulfonamides in large amounts either orally or intravenously, it is the opinion of the authors that initial treatment of burns can best be carried out by local agents. Sulfanilamides for this purpose are best at the present time until antibiotics prove to be of more value in the future. The use of local sulfanilamides in a lanolin-cold cream base, pressure dressings and proper immobilization, permits the entire, or partial omission of cleansing and debridement and frequent changes of dressings. The bandages become quite firm and semirigid after soaking up serum and exudates, forming a satisfactory external splint. During the period of sloughing and epithelialization, dusting with sulfanilamide powder and 10 per cent calcium carbonate plus adhesive strapping and daily washing have proved of value. Blood sulfanilamide levels have not risen above 3.2 mg. per cent. This local type of burn therapy makes early skin grafting possible.

Nephrostomy in Anuria Due to Stone in an Already Nephrectomized Patient, Antonio Ruffo, Bol. e Mem. Soc. Piemontese di Chir. **17**:237, 1947. Even though anuria due to a stone in a patient with one kidney represents a serious problem, a good possibility for success exists if one intervenes early and reduces the operative trauma to a minimum. Nephrostomy should be practiced even though the obstacle, which was the primary cause of the anuria, is eliminated. The primary or mechanical factor of anuria is associated with a neuromuscular imbalance of the excretory function of the kidney. The return of the equilibrium is favored by nephrostomy.

New Treatment of Anuria, Chauvin E. (Marsiglia), Bol. e Mem. Soc. Piemontese di Chir. **17**:217, 1947.

As the cause and pathogenesis of anuria may be reflex from the paralysis of sensory innervation, or excretory *from the paralysis of the pyelo*ureteral musculature, and secretory from paralysis of the vasomotor innervation, the author advocates the intravenous injection of novocaine and the infiltration of novocaine in the renal pelvis. In 198 cases of various types of anuria only 13 did not respond to this method of treatment. Of the 13, two were benefitted by decapsulation.

The administration of 2 to 10 cc. of a 1 per cent solution of novocaine intravenously results in a diuresis of three times the previous volume. The technic is simple: A needle 10 to 12 cm. in length is inserted dorsally with the patient sitting upright, 4 cm, from the midline and 1 cm. below the twelfth rib. The needle travels laterally to the body of the vertebra, and after piercing the muscular wall and reaching empty space, which is perirenal fat, 25 cc. of a 1 per cent novocaine solution is injected.

In Memoriam

CHARLES H. McKENNA

M.D., F.A.C.S., F.I.C.S.

The medical profession has lost one of its most valued members by the untimely death of Dr. Charles H. McKenna, who died at the age of 62 after an illness of six weeks. Dr. McKenna was born in Milbank, South Dakota, in 1885 and received his medical degree from Northwestern Medical School in 1913. His postgraduate studies took him to Wales, Scotland and France; in France he served as Chief of the Orthopedic Hospital at St. Nazaire in 1918 and 1919.

Dr. McKenna was chief of medicine and former chief of staff at Holy Cross Hospital, Chicago, and he practiced surgery for some 34 years on the south side of this city He was a fellow of the American College of Surgeons and the International College of Surgeons. He is survived by his widow and two children.

LOUIS RICHARD HAAS

M.D., F.A.C.S., F.I.C S.

It is with deep sorrow that we announce the death of Dr. Louis Richard Haas, who died very suddenly, at the age of 44, of a heart attack while attending a patient. Dr. Haas was born in 1903 at Union City, N. J., and graduated in medicine from Cornell University Medical School in 1929. He took his postgraduate studies at Temple University in Philadelphia and Chicago Eye and Ear Hospital. After further work in New York, he went to Pittsburgh to practice as specialist in eye, ear, nose and throat diseases.

Dr Haas was a member of the Crawford County and Kansas State medical societies, the Kansas City Society of Ophthalmology and Otolaryngology, the American Medical Association, the American Academy of Ophthalmology and Otolaryngology, the American College of Surgeons, The International College of Surgeons, and a certified Member of the American Boards of Ophthalmology and Otolaryngology. He made numerous contributions to the literature of his chosen field of medicine.

Dr. Haas is survived by his widow, his father and two sisters.

COL. WILLIAM J. CARRINGTON

M.D., F.A.C.S., F.I.C.S.

Dr. William J. Carrington, 63, president in 1934 of Kiwanis International and a former vice-president of the American Medical Association, died recently after a long illness at his home in Clinton, Iowa. Until illness forced his retirement a year ago, he had been chief of surgical services in Schick General Hospital at Clinton. He served as colonel in the Army Medical Corps during World War II. He was born in Jefferson City, Mo., and graduated in medicine from the University of Missouri and the Jefferson Medical College of Philadelphia. A fellow of the American College of Surgeons and the International College of Surgeons and a leading gynecologist, he was the author of numerous articles in medical literature. Col. Carrington is survived by his widow, a son and five daughters.

JAMES ROBERT GOODALL

M.D., C.M.,D.SC., F.R.C.O.G., F A.C.S., F.I.C.S.

Dr. James Robert Goodall, internationally famous surgeon, scientist, philosopher and linguist, died suddenly at the Montreal General Hospital after a brief illness in his 70th year. Dr. Goodall was born in Ottawa in 1877; he graduated in medicine from McGill University in 1901. After graduation he spent four years of internship at the Royal Victoria Hospital in Montreal in medicine, surgery, obstetrics and gynecology, before proceeding to postgraduate work in London, Edinburgh, Paris and Berlin. During World War I he served with the 5th Royal Mounted Rifles overseas as Battalion medical officer in the front lines and was wounded three times during the second battle of Ypres in 1916; on three occasions he was mentioned in dispatches for service to his country.

His work in gynecology made him known throughout the world, and his contributions to the literature not only of medicine but other cultural fields were numerous and penetrating studies. His best known book is his study on Endometriosis, Endosalpingiosis, Endocervicosis and Peritoneo-Ovarian Sclerosis, a subject on which he was classed as an authority. Dr Goodall had a wide knowledge of modern literature and was an accomplished linguist, being able to converse in five different languages. Music was one of his hobbies, and in later years he became intensely interested in philosophy. He was working on a philosophical book entitled Religio Chirurgi at the time of his death and had recently presented in Toronto a paper on The History of Man's Concept of the Soul.

Dr. Goodall is survived by his widow, one son, two daughters and one brother. He leaves behind him a record of a life of single-minded devotion to suffering humanity.

WALTER BARCLAY MOUNT

M.D., F.A.C.S., F.I.C.S.

It is with sincere regret that we record the untimely passing of Dr. Walter Barclay Mount who at the age of 68 died on February 17, 1948, following a heart attack. Dr. Mount was born in New York and received his medical degree from the College of Physicians and Surgeons. He first served in the Sloane Hospital for Women and the Vanderbilt Clinic. Later he settled in the Montclair area where he was attending obstetrician of St. Vincent's Hospital of Montclair at the time of his death. Dr. Mount also served in World War I. He was active in many medical and social societies and held a number of executive offices. He was a Fellow of the American College of Surgeons, and, since 1945, of the International College of Surgeons. He was accorded Founder Fellowship recently by the latter body. He is survived by his widow, a son, three daughters, two brothers and five grandchildren.

The Radicability of Methods to Eliminate Colostomy: A Critical Review*

HARRY E. BACON, M.D., F.A.C.S., F.I.C.S. AND ROBERT J. ROWE, M.D.
PHILADELPHIA, PENNSYLVANIA

IN Europe, an abdominal colostomy is not and never has been acceptable, as disclosed by personal interviews with Seneque of Paris and Louschy of Luxembourg and published reports by Hochenegg, Kraske, Kirschner, Schmeiden, Mandl and d'Allaines, as well as numerous others. In this country, the frequent and often unnecessary establishment of a permanent stoma as an integral part of resection has prompted surgeons to ascertain whether procedures designed to eliminate colostomy, as advocated by Babcock, Berg, Wangensteen and Dixon, are justified. Criticism from advocates of the principles laid down by Miles has been vigorous, and such is commendable until evidence is available to show that the performance of such procedures do not alter our objective in the treatment of cancer, namely, complete eradication of the disease

It is our purpose to consider impartially phases pertinent to "proctosigmoidectomy" as suggested by Babcock in 1932. The questions arise: (1) Does preservation of the sphincter musculature compromise radicability? (2) How does the radicability of "proctosigmoidectomy" compare with other procedures? and (3) What are the comparative survival rates of cure?

In respect to the first question, the histopathologic evidence of retrograde flow in carcinoma is of vital import. Perhaps it would not be amiss to bring to date our knowledge of the subject and to employ direct quotations rather than literal interpretations.

As early as 1897 Waldeyer called attention to the facility with which epithelial cells spread in reverse direction to the lymph stream, while von Recklinghausen described a direct reversal of the lymph stream in a case of cancerous obstruction of the thoracic duct. Miles in 1923 contended that cancer extends in three directions, previously described as the "zones of spread," offering evidence, in support of his operation "abdominoperineal excision," that the incidence of recurrence could be greatly diminished by wide surgical extirpation including contiguous gland-bearing tissues. His method was immediately accepted and since then has been practiced successfully in all parts of the civilized world. Westhues of Erlangen, however, in 1934 published a noteworthy treatise which should be read in the original German or at least in an accurate translation by those interested in malignancy of the lower bowel. His sincerity of purpose is clearly portrayed in the following sentence: "From the huge mass of individual studies . . . every possibility of error must be excluded. When, for example, on the basis of my studies I make the statement that rectal carcinoma never metastasizes into the analward situated lymph nodes, one can see to what consequences an error in the study could lead." His investigations confirmed the work of Staemmler and Fischer, that rectal carcinoma has a strikingly small tendency toward lateral spread in the bowel wall layers, especially upward or downward. To quote: "Regional metastases lie only at the level of or above the carcinoma itself, *practically exclusively in the neighborhood* of the superior hemorrhoidal vessels and and its branches . . . that these local metastases are situated up to 12 cm. above the carcinoma . . . below the carcinoma the perirectal and retrorectal tissue is always free of metastasis. Hence in the radical operation it is necessary to remove the perirectal and retrorectal fatty and connective tissue at the level of the carcinoma itself and above this for 12 cm. Below the carcinoma, not only

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* Read before the Second Southern Assembly, United States Chapter, International College of Surgeons, Feb 28, 1947, Tampa, Fla.

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TABLE 1. INCIDENCE OF RETROGRADE NODAL METASTASES

Author	Specimens in Series Studies	Showing Ca.	Distance Below Lesion In Cm.
McVay	100	1	1
Wood and Wilkie	100	0	0
Westhues	74	1	1
Gabriel, Dukes and Bussey	100	2	1
Gilchrist	74	6	4
Coller *et al.*	53	1	1
Grinnell	75	1	1
Colp	18	1	3
		1	5
Glover and Waugh	100	27	0–1
		6	1–2
		1	2–3
		1	3–4
		1	6–7
Bacon	146	2	2
		1	6

pathologic requirements. In conclusion they remark, "When these facts become more generally appreciated and the technical procedures required for such surgery are sub-
jected to refinement, many sufferers from
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existence without the psychologic,
ing of the anatomic detriments

TABLE 2. ABDOMINOPERINEAL PROCTOSIGMOIDECTOMY IN 146 CASES OF ADENOCARCINOMA

No.	Pt.	Age	Sex	Grade	Cm. Bowel Removed	Lesion Circumference	Section Below Growth in cm.		
							2	4	6
1.	E. McR.	63	M	II	27	Entire	0	0	0 C
2.	F. W.	62	F	II	25	1/4	0	0	0 C
3.	W. O.	52	M	II	31	Entire	+	+	+ C
4.	G. S.	55	M	III	26	Entire	0	0	0 C
5.	T. D.	55	M	III	25	Entire	0	0	0 C
6.	P. C.	39	M	II	43	1/2	0	0	0 C
7.	E. R.	42	F	II	19	3/4	0	0	0 C
8.	M. B.	66	M	II	22	Entire	0	0	0 C
9.	S. L.	65	F	II	13	Entire	0	0	0 C
10.	D. C.	36	F	II	24	Entire	0	0	0 C
11.	P. G.	57	M	II	22	Entire	0	0	0 C
12.	J. K.	58	M	III	31	Entire	0	0	0 C
13.	S. A.	42	F	II	24	1/4	0	0	0 –
14.	J. P.	52	F	II	10	1/8	0	0	0 –
15.	J. R.	60	F	II	31	Entire	0	0	0 C
16.	F. A.	58	M	II	19	Entire	0	0	0 C
17.	M. D.	49	M	III	22	1/8	0	0	0 C
18.	E. H.	74	F	III	30	Entire	0	0	0 B
19.	E. S.	64	M	IV	37	3/4	0	0	0 C
20.	E. V.	58	F	III	19	Entire	+	0	0 C
21.	A. R.	72	F	II	28	3/4	0	0	0 C
22.	E. H.	57	M	II	29	3/4	0	0	0 B
23.	B. W.	38	M	III	21	3/4	0	0	0 C
24.	L. W.	39	F	II	26	1/4	0	0	0 C
25.	H. K.	62	F	II	36	Entire	0	0	0 B
26.	B. O.	40	F	II	24	Entire	0	0	0 C
27.	C. T.	58	M	I	25	1/2	0	0	0 –
28.	J. B.	44	M	II	19	Entire	0	0	0 C
29.	E. S.	72	M	II	21	Entire	0	0	0 C
30.	R. B.	58	M	II	20	Entire	0	0	0 C
31.	M. P.	65	F	II	26	Entire	0	0	0 C
32.	A. K.	57	F	II	21	3/4	0	0	0 C
33.	V. C.	60	M	II	19	3/4	0	0	0 C
34.	C. B.	68	M	II	21	Entire	0	0	0 C
35.	S. B.	56	M	II	24	Entire	0	0	0 C
36.	V. L.	56	M	II	16	Entire	0	0	0 B
37.	G. G.	61	M	III	37	Entire	0	0	0 B
38.	J. F.	45	F	II	33	Entire	0	0	0 B
39.	M. R.	59	F	II	20	1/2	0	0	0 C
40.	A. V.	64	F	II	22	3/4	0	0	0 B
41.	P. G.	41	F	III	14	Entire	0	0	0 C
42.	G. McF.	73	M	II	27	3/4	0	0	0 B
43.	L. K.	35	F	II	22	3/4	0	0	0 B
44.	W. G.	66	M	II	24	3/4	0	0	0 A
45.	J. C.	55	M	II	28	Entire	0	0	0 B
46.	W. H.	41	M	II	17	3/4	0	0	0 B
47.	A. DeG.	68	M	II	40	Entire	0	0	0 B
48.	A. K.	55	M	III	22	3/4	0	0	0 C
49.	H. T.	32	F	II	28	Entire	0	0	0 B
50.	H. T.	32	F	II	30	1/2	0	0	0 B

the bowel but also the corresponding connective tissue can be left without danger of recurrence." He further remarks, "It can be absolutely established that the bowel is healthy 1 to 1½ cm. below the carcinoma; hence the resection line can be set unhesitatingly 2 to 3 cm. from the growth." Gabriel, Dukes and Bussey, the following year, observed in their group of 100 specimens that the first glands to be affected are those in the immediate vicinity of the growth, after which a continuous spread takes place along the glands accompanying the superior hemorrhoidal vessels. "Lateral or downward lymphatic spread is found only in a late stage of the disease where the hemorrhoidal lymphatic vessels are blocked by metastasis." Gilchrist also mentions that retrograde metastasis below the tumor may occur where there is gross enlargement of high-lying nodes with lymphatic blockage. He found retrograde metastatic involvement of lymph nodes below the growth in six instances; in every case, however, the nodes central to the lesion were completely replaced by carcinoma showing marked obstruction to lymph flow and metastasis by retrograde means. Coller and his coworkers comment thus: "In no lesion of which the inferior border (of the growth) was 3 cm. or more above the mucocutaneous (pectinate or anorectal) junction did we find metastases along the lateral zone of spread. Grinnell in a series of 75 specimens cites one case in which upward, lateral and downward spread occurred from a growth located 6 cm. above the pectinate line."

Lymphatic spread downward and laterally, according to Norbury, occurs only with an advanced growth where the whole superior hemorrhoidal lymphatic path is blocked by metastasis. Quite recently, Glover and Waugh examined 100 postoperative specimens and demonstrated that even in far advanced carcinoma retrograde spread along the course of the bowel occurs to any appreciable degree only in 1 per cent. In the face of such rarity it may be justified to state that retrograde metastasis never occurs from growths still in the stage of reasonable operability. Section of the bowel must be at least 2 cm. below the lower palpable edge of the lesion to satisfy pathologic requirements. In conclusion they remark, "When these facts become more generally appreciated and the technical procedures required for such surgery are subjected to refinement, many sufferers from neoplastic lesions will enjoy a normal postoperative existence without the psychologic, to say nothing of the anatomic, detriments of a permanent artificial anus."

TABLE 1. INCIDENCE OF RETROGRADE NODAL METASTASES

Author	Specimens in Series Studies	Showing Ca.	Distance Below Lesion In Cm.
McVay	100	1	1
Wood and Wilkie	100	0	0
Westhues	74	1	1
Gabriel, Dukes and Bussey	100	2	1
Gilchrist	74	6	4
Coller *et al.*	53	1	1
Grinnell	75	1	1
Colp	18	1	3
		1	5
Glover and Waugh	100	27	0–1
		6	1–2
		1	2–3
		1	3–4
		1	6–7
Bacon	146	2	2
		1	6

Consistent with these reports, it seems appropriate to mention our experience in a group of 146 patients (Table 2) in whom the extirpated specimen of bowel was sectioned 2, 4 and 6 cm. below the lower edge of the growth. In all, an abdominoperineal proctosigmoidectomy without colostomy was performed. This operation was instituted only where the distance between the anal margin and the lower border of the growth was 6 cm. (3 cm. above anorectal line) or more. It will be noted that in Case 3, W.O., metastasis was present to a distance of 6 cm. below the growth. All superior lymphatics disclosed extensive lymph blockage. Case 20, E.V., showed invasion at 2 cm. distance below the growth.

TABLE 2. ABDOMINOPERINEAL PROCTOSIGMOIDECTOMY IN 146 CASES OF ADENOCARCINOMA

No.	Pt.	Age	Sex	Grade	Cm. Bowel Removed	Lesion Circumference	Section Below Growth in cm.		
							2	4	6
1.	E. McR.	63	M	II	27	Entire	0	0	0 C
2.	F. W.	62	F	II	25	1/4	0	0	0 C
3.	W. O.	52	M	II	31	Entire	+	+	+ C
4.	G. S.	55	M	III	26	Entire	0	0	0 C
5.	T. D.	55	M	III	25	Entire	0	0	0 C
6.	P. C.	39	M	II	43	1/2	0	0	0 C
7.	E. R.	42	F	II	19	3/4	0	0	0 C
8.	M. B.	66	M	II	22	Entire	0	0	0 C
9.	S. L.	65	F	II	13	Entire	0	0	0 C
10.	D. C.	36	F	II	24	Entire	0	0	0 C
11.	P. G.	57	M	II	22	Entire	0	0	0 C
12.	J. K.	58	M	III	31	Entire	0	0	0 C
13.	S. A.	42	F	II	24	1/4	0	0	0 –
14.	J. P.	52	F	II	10	1/8	0	0	0 –
15.	J. R.	60	F	II	31	Entire	0	0	0 C
16.	F. A.	58	M	II	19	Entire	0	0	0 C
17.	M. D.	49	M	III	22	1/8	0	0	0 C
18.	E. H.	74	F	III	30	Entire	0	0	0 B
19.	E. S.	64	M	IV	37	3/4	0	0	0 C
20.	E. V.	58	F	III	19	Entire	+	0	0 C
21.	A. R.	72	F	II	28	3/4	0	0	0 C
22.	E. H.	57	M	II	29	3/4	0	0	0 B
23.	B. W.	38	M	III	21	3/4	0	0	0 C
24.	L. W.	39	F	II	26	1/4	0	0	0 C
25.	H. K.	62	F	II	36	Entire	0	0	0 B
26.	B. O.	40	F	II	24	Entire	0	0	0 C
27.	C. T.	58	M	I	25	1/2	0	0	0 –
28.	J. B.	44	M	II	19	Entire	0	0	0 C
29.	E. S.	72	M	II	21	Entire	0	0	0 C
30.	R. B.	58	M	II	20	Entire	0	0	0 C
31.	M. P.	65	F	II	26	Entire	0	0	0 C
32.	A. K.	57	F	II	21	3/4	0	0	0 C
33.	V. C.	60	M	II	19	3/4	0	0	0 C
34.	C. B.	68	M	II	21	Entire	0	0	0 C
35.	S. B.	56	M	II	24	Entire	0	0	0 C
36.	V. L.	56	M	II	16	Entire	0	0	0 B
37.	G. G.	61	M	III	37	Entire	0	0	0 B
38.	J. F.	45	F	II	33	Entire	0	0	0 B
39.	M. R.	59	F	II	20	1/2	0	0	0 C.
40.	A. V.	64	F	II	22	3/4	0	0	0 B
41.	P. G.	41	F	III	14	Entire	0	0	0 C
42.	G. McF.	73	M	II	27	3/4	0	0	0 B
43.	L. K.	35	F	II	22	3/4	0	0	0 B
44.	W. G.	66	M	II	24	3/4	0	0	0 A
45.	J. C.	55	M	II	28	Entire	0	0	0 B
46.	W. H.	41	M	II	17	3/4	0	0	0 B
47.	A. DeG.	68	M	II	40	Entire	0	0	0 B
48.	A. K.	55	M	III	22	3/4	0	0	0 C
49.	H. T.	32	F	II	28	Entire	0	0	0 B
50.	H. T.	32	F	II	36	1/2	0	0	0 B

TABLE 2. ABDOMINOPERINEAL PROCTOSIGMOIDECTOMY IN 146 CASES OF ADENOCARCINOMA—*Continued*

No.	Pt.	Age	Sex	Grade	Cm. Bowel Removed	Lesion Circumference	Section Below Growth in cm. 2	4	6
51.	F. B.	47	F	III	32	3/4	0	0	0 C
52.	T. D.	56	M	II	26	Entire	0	0	0 C
53.	L. M.	42	M	II	29	Entire	0	0	0 B
54.	M. H.	62	F	N.G.*	27	1/4	0	0	0 B
55.	C. M.	49	M	III	41	1/2	0	0	0 B
56.	N. M.	35	F	IV	35	Entire	0	0	0 C
57.	J. D.	53	M	II	31	1/2	0	0	0 C
58.	E. C.	59	F	II	32	1/2	0	0	0 B
59.	C. R.	58	F	III	42	Entire	0	0	0 B
60.	A. D.	73	F	II	30	1/2	0	0	0 C
61.	B. C.	34	F	II	41	1/2	0	0	0 B
62.	H. R.	53	M	II	32	Entire	0	0	0 B
63.	M. M.	62	F	I	25	1/4	0	0	0 B
64.	A. D.	69	F	II	22	1/4	0	0	0 B
65.	J. A.	66	M	II		1/4			
66.	E. C.	56	F	II	31	3/4	0	0	0 B
67.	S. S.	40	F	II	32	Entire	0	0	0 B
68.	E. W.	56	M	II	42	3/4	0	0	0 B
69.	M. H.	62	F	II	29	1/4	0	0	0 B
70.	B. C.	53	F	II	28	Entire	0	0	0 B
71.	T. O.	50	M	II	28	Entire	0	0	0 B
72.	J. DeP.	60	M	II	54	Entire	0	0	0 B
73.	W. J.	35	M	I	92	1/5	0	0	0 A
74.	A. K.	70	F	II	26	1/2	0	0	0 B
75.	K. C.	34	F	II	18	Entire	0	0	0 B
76.	C. W.	71	F	II	26	1/2	0	0	0 B
77.	F. G.	38	F	II	28	1/2	0	0	0 B
78.	N. G.	61	F	III	20	1/4	0	0	0 C
79.	M. T.	49	F	II	32	1/2	0	0	0 C
80.	M. S.	37	F	II	38	1/4	0	0	0 C
81.	A. K.	58	F	II	26	1/4	0	0	0 A
82.	I. B.	54	M	I	42	1/5	0	0	0 A
83.	P. D.	50	M	III	34	Entire	0	0	0 C
84.	R. J.	55	F	II	28	Entire	0	0	0 B
85.	E. C.	56	M	II	28	3/4	0	0	0 B
86.	S. G.	50	M	III	22	Entire	0	0	0 B
87.	J. B.	63	M	III		Entire	0	0	0 C
88.	M. S.	65	M	II	38	1/4	0	0	0 B
89.	M. D.	41	M	II	33	1/4	0	0	0 B
90.	T. M.	54	M	I	26	1/4	0	0	0 A
91.	P. S.	57	M	II	32	3/4	0	0	0 C
92.	E. W.	49	F	II	27	3/4	0	0	0 B
93.	M. K.	32	F	II	30	3/4	0	0	0 B
94.	A. L.	56	M	I	34	1/2	0	0	0 B
95.	E. S.	59	M	II	23	1/2	0	0	0 A
96.	C. S.	58	M	I	26	1/4	0	0	0 A
97.	W. B.	67	M	II	28	Entire	0	0	0 C
98.	C. P.	64	F	III	24	Entire	0	0	0 B

[illegible]

TABLE 2. ABDOMINOPERINEAL PROCTOSIGMOIDECTOMY IN 146 CASES OF ADENOCARCINOMA—*Continued*

No.	*Pt.*	*Age*	*Sex*	*Grade*	Cm. *Bowel* Removed	Lesion *Circum-*ference	Section Below Growth in cm. 2	4	6
99.	C. M.	51	F	II	37	3/4	0	0	0 B
100.	J. H.	67	M	II	40	Entire	0	0	0 C
101.	R. M.	60	F	II	34	Entire	0	0	0 C
102.	C. T.	56	M	II	27	Entire	0	0	0 C
103.	G. K.	62	M	II	21	3/4	0	0	0 C
104.	H. L.	55	M	II	41	3/4	0	0	0 B
105.	C. B.	32*	M	I	68	1/4	0	0	0 A
106.	A. C.	63	F	II	22	Entire	0	0	0 C
107.	J. T.	62	M	II	39	Entire	0	0	0 C
108.	B. G.	35	F	III	49	1/2	0	0	0 C
109.	H. A.	50	F	III	50	1/2	0	0	0 C
110.	L. G.	59	M	II	36	1/2	0	0	0 B
111.	E. A.	74	F	III	24	3/4	0	0	0 A
112.	G. M.	52	M	I	28	1/5	0	0	0 A
113.	A. T.	42	F	IV	38	3/4	0	0	0 C
114.	J. S.	63	M	II	34	Entire	0	0	0 C
115.	W. M.	65	M	II	26	1/2	0	0	0 B
116.	W. M.	47	M	II	29	1/2	0	0	0 B
117.	R. B.	48	M	I		1/4	0	0	0 A
118.	S. K.	58	M	II	36	Entire	0	0	0 B
119.	R. D.	51	M	II	52	Entire	0	0	0 C
120.	C. M.	78	F	I	22	1/4	0	0	0 A
121.	M. R.	59	F	II	27	1/4	0	0	0 B
122.	J. C.	61	M	II	22	1/2	0	0	0 A
123.	Q. G.	60	M	I	41	Entire	0	0	0 A
124.	C. T.	58	M	II	27	1/2	0	0	0 A
125.	I. S.	57	M	I		1/4	0	0	0 A
126.	L. W.	59	F	II	27	3/4	0	0	0 B
127.	E. V.	72	F	II	22	Entire	0	0	0 B
128.	A. R.	58	F	II	24	Entire	0	0	0 C
129.	E. A.	42	F	II	64	1/2	0	0	0 B
130.	A. B.	63	F	II	29	1/4	0	0	0
131.	C. H.	36	M	II	26	1/4	0	0	0 B
132.	D. P.	68	M	II	30	Entire	0	0	0 B
133.	N. H.	46	F	II	26	3/4	0	0	0 B
134.	G. B.	63	M	III	63	Entire	0	0	0 B
135.	L. S.	66	F	II	27	1/4	0	0	0 B
136.	M. K.	59	M	II	36	Entire	0	0	0 B
137.	J. O.	70	M	II	34	3/4	0	0	0 B
138.	J. A.	47	M	I	—	1/4	0	0	0 A
139.	M. W.	60	F	II	37	Entire	0	0	0 B
140.	E. L.	52	F	III	31	Entire	0	0	0 C
141.	M. B.	57	F	II	62	3/4	0	0	0 B
142.	E. C.	66	F	II	29	Entire	0	0	0 C
143.	M. K.	58	M	II	34	0	0	0	0 B
144.	G. S.	54	M	II	34	Entire	0	0	0 B
145.	A. G.	54	M	II	38	1/5	0	0	0 A
146.	L. C.	57	F	II	36	1/4	0	0	0 A

* Polyposis.

If it be permissible to draw conclusions relevant to the investigations mentioned, the authors' inclination would be to concur with Grinnell in that "it seems evident that downward spread is of little importance except in advanced cases which are probably already inoperable because of extension along the main lymphatic route upward." Such may be regarded as evidence that preservation of the sphincter musculature does not compromise radicability.

In answer to the second question, How does the radicability of proctosigmoidectomy compare with other procedures, and does the procedure permit wide surgical removal of the gland-bearing areas?, one must be mindful that the employment of any method, independent of type, may be performed radically or conservatively according to the individual surgeon. This fact is clearly evidenced by the variations of technic in the performance of the customary Mikulicz procedure. Abdominoperineal proctosigmoidectomy as it should be performed, calls for and permits of wide excision of the mesosigmoid, wide removal of the adjacent pelvic peritoneum, wide removal of the perirectal tissues and gland-bearing areas and wide excision of the levators. It has been reported that the usual point of ligation in performing the perineoabdominal (Gabriel) or abdominoperineal excision (Miles) is 10 in. (25 cm.) from the tip of the coccyx; in proctosigmoidectomy the point of ligation has averaged between 38 and 55 cm. Such high point of ligation permits additional removal of mesosigmoid. In the Miles operation, customarily the average surgeon will divide the peritoneum conservatively in each gutter and especially in the pelvis close to the bowel for the purpose of later establishing a diaphragm; in proctosigmoidectomy greater removal is permitted since no complete floor is made. By the same token some report utilization of the iliac sigmoid as a midline colostomy in order to extend the radicability of the Miles procedure; in proctosigmoidectomy mobilization of this portion of the bowel (iliac sigmoid) is made routinely.

The next question concerns the survival rate in terms of five-year cures following proctosigmoidectomy compared to other methods. It should be mentioned that Eiselsberg of Vienna, Sauerbruch of Munich, Payr of Leipzig, Mandl of Jerusalem, Gulede of Jena and Kirschner of Tübingen have reported a higher rate of three- and five-year cures where the muscles were not sacrificed. Similar published articles are to be found by Eichoff and Pribram.

Only a small number of our patients can be evaluated for the period over five years, but of those it will be observed that the rate compares very favorably when one considers the percentage of resectability, the rate of mortality, and the fact that resection was instituted for palliation as well as for cure. By employing the method suggested by Newman of the British Ministry of Health and by Dukes, the five year survival rate is computed from the customary fraction:

$$\frac{\text{alive at 5 years x 100}}{\text{resection deaths, less those untraced and died of other causes}}$$

Of the 77 patients resected more than five years ago 52.6 per cent are living and well.

It is interesting to note that the records of these 77 patients showed that the histopathologic reports in 20 instances conformed to Grade A (mural penetration), as suggested by Dukes. Of this number, 4 were Grade I and 15 were Grade II (1 was ungraded).

Available reports by various authors employing other methods where colostomy is established without preservation of sphincter muscle are appended in Table 4.

Very few reports include ten-year survival rates.

One frequently inquires, "does proctosigmoidectomy with preservation of the sphincter musculature augment the operative mortality?" A review of the published reports on methods of resection for rectal growths in which the sphincters are retained, shows that the operative mortality compares favorably with the amputative types where a colostomy is an integral part.

TABLE 3. PERCENTAGE OF FIVE-YEAR SURVIVALS CONFORMING TO GRADE A

No. Cases	Died from Operation	Died Under 5 Years		Untraced	Alive at 5 Years	Percentage of 5 Year Cures
		Of Other Causes	Of Cancer			
20	1	2	1	2	14	93.3%

TABLE 4.

Author	Year Reported	No. Cases Resected	(Per Cent) Resectability	(Per Cent) Mortality Rate	Percentage Survivals 5 Years or More	Based on No. Cases
Rankin	1933	300	50–68	7.7	38	?
Lockhart-Mummery	1934	340		8.0	52	95
Jones, T.	1935	127	79	11.0	52	?
Raiford	1935	117	63.5	23.2	36	16
Abel	1935	...	...	...	58.3	70
Jones, D. F.	1936	463		17.1	55.5	?
Brindley	1937	76	52.4	3.9	63	?
Gabriel	1937	100		22	52	?
Miles	1939	?	65	17.0	73	94
Hayden	1945	131	91.2	10.6	33	32
Pfeiffer	1941	82	59	12.8	45	...
Cattell	1943	162	81.4	10.7	53.6	140
Lahey	1939	...	88	10	42	...
Daniels	1945	...	80	?	36	?
Dixon	1944	...	...	...	44–53	...
Gabriel-Dukes	1944	514		15	44.9	...

TABLE 5. TEN YEAR SURVIVAL RATE

Name	Year	No. Cases	Operation	Resectability Rate	Mortality Rate	Survival Rate Ten Years	Based on No. Cases
Rankin	1933	300	Colostomy and Resection	58–68%	7.7%	24.1	?
Babcock and Bacon	1942	414	Abdomino-perineal Proctosig-*moidectomy*	93%	6.6%	18	144

Aside from the *reports* listed in Tables 4 and 5, others are appended as follows.

To May, 1947, one of us (H.E.B.) has performed 145 consecutive resections of all types without a single death. At the present writing proctosigmoidectomy has been carried out in 407 patients for various conditions as shown in Table 8.

Following proctosigmoidectomy, patients usually are permitted out of bed on the fourth or fifth day, and most have been discharged on the tenth or eleventh postoperative day. A recent survey of 120 consecutive patients undergoing proctosigmoidectomy shows that the average stay in bed was 6.6 days, and the average period of hospitalization after operation was 13.4 days.

It is worthy of mention that the presacral wound requires less than three weeks for complete healing and closure. Thus most of our

TABLE 6. RADICAL OPERATION WITH ABDOMINAL COLOSTOMY (OPERATIVE MORTALITY)

Name	Year Reported	No. Cases	Mortality Rate
Shedden	1942	166	9.6
Besser	1945	348	22.2
Cane	1944	84	29
Sugarbaker	1946	147	14
Berger	1944	30	18.5
Zinninger	1943	220	10.2
Romano and Trackten-berg	1943	45	40
Scarborough	1939	95	9.09
Binkley	1942	128	7.8
Fansler	1944	100	5.5
Baker	1944	67	4.4
Mayo, C. W.	1942	179	8.5
Mayo, C. W.	1943	276	6.15
Singleton	1943	46	4.3
Jones, T.	1943	600	7.2
Miles	1933		17
David and Gilchrist	1942	277	7.2
Murdock	1942	87	9.2
Coller and Ransom	1944	285	8.9

TABLE 7. RADICAL RESECTION WITHOUT COLOSTOMY WITH PRESERVATION OF SPHINCTER MUSCULATURE

	Year	Cases	Resectability Rate	Mortality Rate
Hochenegg	1909	320	...	13.7
Kuttner	1928	...	37	16.4
Sauerbruch	1928	...	...	23
Graser	1928	...	53	5.8
Kirschner	1932	122	53	27
Passler	1935	67	44	35
Dietrich	1928	364	64.3	19.5
Payr	1934	...	43	10
Finsterer	1942	388	84	12
Oppolzer and Nitsche	1942	63	60.9	6.3
Babcock and Bacon	1943	414	93	6.6 4.0*
Babcock	1945	98	97	4.08
[illegible]	1946	...	66.7	6.6
Murray	1946	15	...	6.6
D'Allaines	1946	116	80	6.8
[illegible]	1946	25	84	7
[illegible]	1947	304	80.1	4.9

* [illegible]

TABLE 8. ABDOMINOPERINEAL PROCTOSIGMOIDECTOMY

	Cases	Deaths	Mortality Rate
For cancer	376	18	4.9%
For inflammatory stricture	22	0	0
For diverticulitis	3	0	0
For rectosigmoid endometrioma	2	0	0
For procidentia	1	0	0
For kraurosis ani	1	0	0
For benign lymphoma	1	0	0
For megarectum	1	1	100.0%
	407	19	4.6%

TABLE 9.*

No.	Pt.	Age	Sex	Day Out of Bed	Day Discharged After Resection
1.	M.B.	66	M	7	12
2.	T.D.	55	M	6	12
3.	M.L.	59	M	7	12
4.	G.M.	55	M	6	17
5.	J.B.	48	M	8	11
6.	E.O.	64	M	7	12
7.	J.W.	57	M	7	16
8.	E.D.	59	F	6	12
9.	P.K.	55	M	6	12
10.	L.M.	72	M	8	14
11.	L.R.	52	M	8	14
12.	D.M.	69	F	6	14
13.	F.W.	62	F	6	11
14.	E.McR.	63	M	6	12
15.	A.S.	70	F	6	11
16.	P.C.	39	M	6	11
17.	E.R.	42	F	6	15
18.	W.O.	52	M	6	12
19.	T.C.	38	M	8	13
20.	T.F.	69	M	8	15
21.	A.R.	72	F	7	14
22.	E.N.	38	F	10	14
23.	E.K.	68	F	9	12
24.	E.E.	51	F	13	19
25.	J.M.	63	M	8	13
26.	B.M.	52	F	9	13
27.	M.L.	32	F	9	12
28.	F.T.	52	M	8	13
29.	G.W.	60	M	9	15
30.	C.B.	54	M	10	17
31.	A.H.	62	F	9	15
32.	R.F.	52	F	11	21
33.	G.B.	56	F	10	18
34.	C.R.	44	M	9	12

* All these are cases of carcinoma.

TABLE 9—Continued.

No.	Pt.	Age	Sex	Day Out of Bed	Day Discharged After Resection
35.	S.P.	55	M	8	12
36.	M.M.	29	F	8	11
37.	V.P.	58	F	10	16
38.	H.S.	51	M	8	15
39.	A.H.	64	M	9	19
40.	M.M.	62	M	7	12
41.	M.T.	46	F	7	18
42.	A.S.	70	F	9	20
43	G.W.	70	M	9	22
44	A.V.	64	F	6	11
45	J.C.	55	M	6	11
46	M.R.	52	F	6	11
47.	S.K.	58	M	6	12
48	A.McF	73	M	9	18
49	S.S	64	F	6	11
50.	W.H.	41	M	6	11
51	W.G.	66	M	6	12
52.	L.K.	35	F	6	11
53.	L.L.	41	F	6	11
54.	H.T.	32	F	6	11
55.	A.DeG.	68	M	9	19
56	J.F.	45	F	6	11
57.	G.G.	61	F	6	12
58.	C.B.	61	M	16	30
59.	A.K.	57	F	6	12
60.	W.J.	35	M	7	11
61.	R.B.	58	M	6	11
62	J.H.	56	F	7	15
63.	H.T.	32	F	6	11
64.	J.D.	55	M	6	11
65.	W.H.	41	M	6	11
66.	S.S	64	F	6	11
67.	L.M	42	M	6	11
68.	L R.	49	F	6	12
69.	G C.	65	F	6	24
70.	F S.	53	F	6	10
71	L C.	57	F	6	11
72.	F.H.	69	M	5	11
73.	A.T.	66	F	6	11
74	M.S.	54	M	6	11
75.	C.D.	29	M	6	11
76.	A.B.	72	M	6	11
77.	C H.	36	M	6	13
78.	N.H.	46	F	5	11
79.	A.T.	42	F	5	11
80.	J.O.	70	M	5	12
81.	M.K.	59	M	5	11
82.	M.W.	60	F	6	14
83.	E.L.	52	F	7	13
84.	E.C.	68	F	4	11
85.	M.K.	58	M	6	18
86.	A.G.	54	M	5	11

TABLE 9—Continued.

No.	Pt.	Age	Sex	Day Out of Bed	Day Discharged After Resection
87.	G.K.	62	M	5	11
88.	M.H.	67	F	6	11
89.	B.C.	34	F	6	11
90.	H.R.	52	M	6	11
91.	M.M.	62	F	6	12
92.	J.A.	66	M	6	11
93.	H.L.	55	M	6	11
94.	C.B.	32	M	6	13
95.	H.A.	50	F	6	11
96.	B.G.	35	M	6	11
97.	D.P.	69	M	6	12
98.	G.B.	62	M	6	18
99.	L.S.	66	F	6	11
100.	C.S.	58	M	5	14
101.	C.T.	56	M	6	12
102.	E.C.	40	M	5	11
103.	W.M.	65	M	5	11
104.	J.H.	67	M	5	17
105.	C.M.	51	F	6	18
106.	C.R.	54	M	5	10
107.	A.C.	63	F	5	11
108.	I.D.	49	M	6	11
109.	E.C.	56	M	6	15
110.	R.J.	58	M	10	35
111.	M.S.	65	M	6	13
112.	M.D.	41	M	5	14
113.	T.M.	54	M	5	11
114.	M.K.	35	F	5	11
115.	E.S.	59	M	5	11
116.	M.F.	57	F	6	13
117.	K.C.*	34	F	6	12
118.	R.B.	39	M	6	11
119.	J.C.	55	M	6	11
120.	S.K.	58	M	6	11

* Complicated by 3 months pregnancy.

patients were able to return to their former or perhaps lighter occupations in an average of six to 10 weeks following operation. In our other type of abdominoperineal extirpation, in which a large perineal wound is made, at least three months was the average period required for healing.

SUMMARY AND CONCLUSIONS

From the foregoing, it is deemed pertinent to draw the following conclusions:

1. Preservation of the sphincter musculature does not compromise radicability provided specific principles are carefully adhered to.

2. The radicability of proctosigmoidectomy compares favorably with other procedures and in some respects permits of even wider excision.

3. The survival rate of five and 10-year cures is equal to and in some instances betters the results following the abdominoperineal excision of Miles or the perineoabdominal excision of Gabriel. This is true especially when the rate of resectability is considered. A survival rate of 52.6 per cent for five-year cure is reported; the survival rate for Grade A growths is 93.3 per cent for five years.

4. Proctosigmoidectomy with preservation of the sphincter musculature does not augment the operative mortality; for cancer our mortality rate is 4.9 per cent as based on 376 cases.

5. The morbidity, immediate and remote, is in no way compromised. A consecutive group is reported in which the average stay in bed was 6.6 days, and the average hospital stay after operation was 13.4 days.

SOMMAIRE

La préservation de la musculature sphinctérienne ne compromet pas la radicabilité, pourvu que les principes fondamentaux de la technique opératoire soient observées.

La radicabilité de la proctosigmoïdectomie compare favorablement d'autres procédés et sur certains rapports permet une excision plus étendue.

La survivance de 5 a 10 ans égale et dans certains cas donne de meilleurs résultats que l'excision abdominopérineale de Miles ou l'excision périneoabdominale de Gabriel. Cela est surtout le cas quand on considère l'étendue de la resectabilité. Une survivance de 5 ans pour 52.6% est rapportée. Dans les cas de tumeur de grade "A", on a obtenu une survivance de 5 ans dans 93.3% des cas.

La proctosigmoïdectomie avec préservation de la musculature sphinctérienne n'augmente pas la mortalite opératoire; pour les cancers, notre mortalité est de 4.9% (304 cas).

La morbidité immédiate et eloignée n'est nullement affectée. Un groupe est rapporté dans lequel les malades furent alités une moyenne de 6.6 jours. Le séjour moyen à l'hôpital fut de 13.4 jours

SUMARIO

La preservacion de los esfincteres del ano no comprometen las procedimientos quirurjicos radicales siempre y cuando el cirujano se adhiera a ciertos principios especificos.

La proctosigmoidectomia radical compara favorablemente con otros procedimientos y en ciertos respectos permite una mayor excision.

El porcentaje de los que sobreviven de 5 a 10 anos es igual y en ciertos casos los resultados son superiores a los obtenidos con la excision abdomino-perineal de Miles o con el procedimiento de Gabriel. Esto es mas notable cuando se considera el porcentaje de resectabilidad.

La proctosigmoidectomia con preservacion de la musculatura esfincterica no augmenta la mortalidad quirurjica. En nuestros casos de cancer la mortalidad en 304 casos fue de 4.9%.

La morbilidad inmediata y tardia no se ha comprometido. Se reporta un grupo consecutivo de casos en los cuales la estada en cama tuvo un averaje de 6.6 dias y la hospitalizacion post-operatoria fue de 13.4 dias.

RIASSUNTO

La conservazione dello sfintere rettale non compromette la possibilita' di un' operazione radicale, il chirurgo rispetti alcuni principi fondamentali.

La proctosigmoidectomia consente un' escisione radicale—sotto certi rispetti—maggiore degli altri metodi operatori.

La percentuale di sopravvivenza da 5 a 10 anni e' equivalente, se non maggiore, di quella successiva all'escisione addominoperineale secondo il metodo di Miles o l'escisione perineoaddominale di Gabriel.

La percentuale di sopravvivenza riportata dall'A. arriva al 52.6% (dopo 5 anni): per i casi del gruppo A la percentuale raggiunge il 93.3%.

La conservazione dello sfintere non eleva la percentuale della mortalita' operatoria. Sopra 304 casi questa si limita al 4.9%.

Anche la morbilita', immediata e remota, non e' accresciuta. La degenza a letto e'—in media—di 6 giorni: l'ospedelizzazione dopo l'operazione e' di 13.4 giorni.

The Treatment of Metastatic Cancer in Cervical Lymph Nodes*†

JOHN V. BLADY, M.D.
PHILADELPHIA, PENNSYLVANIA

THE treatment of "a lump in the neck" can be one of the most perplexing problems that confronts the physician. Not infrequently the lump in the neck is treated with negligence because so many individuals, at one time or another, have, or have had, a benign "lump in the neck." As a result, the importance of a lump is frequently disregarded or dismissed without concern by both the laity and the medical profession. We, as physicians, must constantly alert ourselves to the possibility that an enlarged cervical lymph node, in the absence of any other subjective symptoms, may be the first intimation of a cancer elsewhere in the body. It is imperative, therefore, that we expend every effort to prove or disprove the presence of cancer in any "lump in the neck," especially when found in the adult.

I do not know the frequency of benign enlarged palpable lymph nodes in the neck, and I know of no reference in the literature that could accurately give us this information. The significance of proved cervical metastases from a malignant neoplasm, however, has received considerable study.

At Temple University Hospital Tumor Clinic from 1940 to 1944 inclusive, a total of 1290 malignant neoplasms of various anatomic regions was observed and studied. Of this total, 175, or 13.5 per cent, presented cervical metastases on admission. An analysis of the origin and incidence of these cervical metastases is shown in Table 1.

TABLE 1. ANALYSIS OF THE INCIDENCE AND ORIGIN OF CERVICAL METASTASES IN 175 PATIENTS *

Larynx	24	Esophagus	4
Hodgkin's disease	24	Reticulum cell sarcoma	4
Piriform sinus	17	Skin	3
Breast	10	Oropharynx	3
Tonsil	9	Epiglottis	3
Nasopharynx and paranasal sinuses	8	Myelogenous leukemia	3
Lymphatic leukemia	8	Buccal mucosa	2
Tongue	7	Thyroid	2
Lymphosarcoma	7	Carotid body	2
Primary undetermined	7	Palate	2
Lung	6	Gingiva	2
Lymphoblastoma	5	Nasal cavity	1
Floor of mouth	5	Hypopharynx	1
Lip	5	Reticuloendotheliosis	1
Total			175

* From 1940 to 1944 inclusive, a total of 1290 malignant neoplasms was observed and studied at Temple University Hospital Tumor Clinic. Of this total, 175, or 13.5 per cent, had cervical metastases on admission.

Fifty-three per cent of the metastases were associated with tumors of the head and neck regions, 30 per cent with lymphoblastomas, 6 per cent in advanced breast cancer, 2 per cent in lung cancer and 2 per cent each in cancer of the skin and cancer of the esophagus. In 4 per cent the primary lesion was not discovered.

Martin[6] recently tabulated the location of the primary lesion in 500 consecutive cases of cervical metastases from cancer of the head and neck regions observed at Memorial Hospital (Table 3). The [illegible]

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* From th ... urgery and
the Depart ... Therapy,
Temple Uni ... ensylvania.
† Read be ... bly, United
States Char ... geons, Chi-
cago, Sept.

TABLE 2. REGIONAL AND DISEASE ORIGIN OF CERVICAL METASTASES.

Region and Disease		Cases	Per Cent
Head and Neck		93	53
Larynx, hypopharynx	45		
Oral cavity	35		
Nasopharynx, nasal cavity and paranasal sinuses	9		
Neck	4		
Lymphoblastoma		52	30
Breast		10	6
Primary undetermined		7	4
Lung		6	3
Esophagus		4	2
Skin		4	2
Total		175	100

TABLE 3. LOCATION OF PRIMARY LESION IN 500 CONSECUTIVE CASES *

	Cases	Per Cent
Tongue	127	25
Floor of mouth	44	9
Extrinsic larynx	44	9
Nasopharynx	40	8
Lip	35	7
Tonsil	34	7
Mucosa of cheek	28	6
Metastatic from undetnd. primary	28	6
Jaw	27	5
Pharyngeal wall	24	4
Palate	20	4
Skin of face	11	2
Thyroid	11	2
Miscellaneous	27	5
Total	500	100

* From Martin, H. E., Ann. Surg. 114:972, 1941.

of the primary lesion are tongue, floor of the mouth, extrinsic larynx and nasopharynx.

From these data it is obvious that a broad view of the problem of treatment of cervical metastases is necessary. We cannot treat all cervical metastases on the basis of experiences gained in the treatment of metastases from only one anatomic region. These data demonstate that all anatomic regions of the oral cavity, naso-, oro-, hypopharynx and neck are capable of metastasizing to cervical lymph nodes. The lymphatic spread varies with the anatomic location of the primary lesion, and the histology, likewise, may show great variations in the degree of malignancy, radiosensitivity and radiocurability, depending on the anatomic origin of the primary growth.

These factors, therefore, must be considered in the selection of the treatment modality of cervical metastases.

Moreland[15] states, "It has been my observation that one is less biased in one's selection of the method of treatment to be followed in a particular case when all methods are equally available and that better judgment can usually be exercised by one familiar with the various methods of treatment."

The following criteria are important considerations in the treatment of each case of cervical metastasis:

1. The cervical metastases must be demonstrated to exist not only clinically, but also histologically, by biopsy. We have found aspiration biopsy as described by Martin and Ellis[9] to be a most useful procedure in proving the presence of metastases. In cases where a negative aspiration biopsy is obtained, a surgical biopsy may be required. A negative aspiration biopsy does not rule out the presence or absence of metastases and must be completely disregarded.

2. Is the treatment for metastases on admission, i.e., at the time the patient is first seen and treatment to the primary lesion is under consideration, or is it for treatment of cervical metastasis developing at a later date and where the primary lesion has been controlled?

3. Location of primary disease.

4. Location and extent of metastases—regional, bilateral, and/or distant.

5. Degree of histologic differentiation of the individual tumor cells.

6. General physical and mental condition of the patient.

After these facts have been carefully weighed, a decision as to choice of treatment may be made so as to give the patient the maximum chance of curability. These criteria are taken into further consideration in the subsequent discussion of treatment of cervical metastases arising from the various anatomic regions.

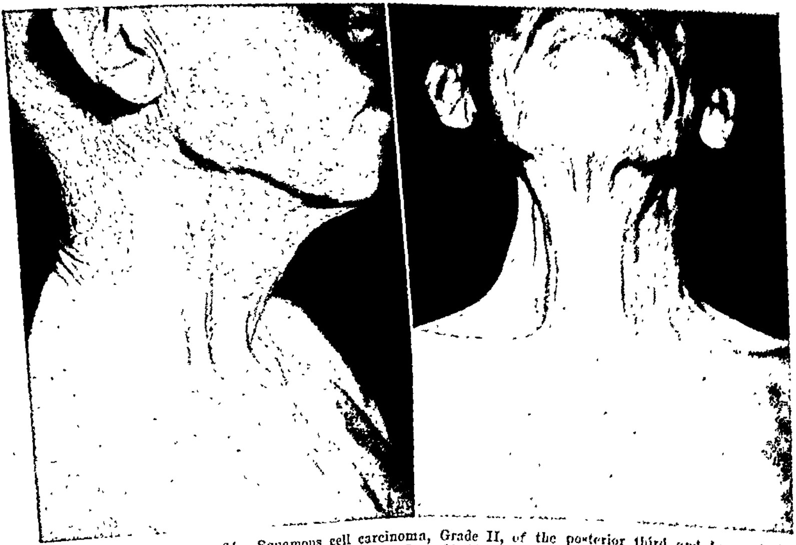

Fig. 1. F.B., male, age 64. Squamous cell carcinoma, Grade II, of the posterior third and base of the right side of the tongue. Treated by resection on Dec. 21, 1945. Cervical metastases appeared in the right upper neck region in August, 1946. A radical neck dissection was performed on Aug. 14, 1946. The photographs indicate the type of incision (left) and appearance of neck (right) on Aug. 8, 1947.

The accepted methods of treatment of cervical metastases are:

1. Surgery, either in the form of a radical or partial neck dissection.
2. Roentgen ray radiation combined with interstitial radiation.
3. Interstitial radiation by implantation of radium or radon.
4. Combinations of the above methods, that is, surgical exploration with implantation of radon, surgical excision with implantation of radon, or neck dissection with implantation of radon.

SURGICAL TREATMENT OF CERVICAL METASTASES

The scope of this paper does not permit a detailed discussion and analysis of the surgical technic which should be followed in performing radical neck dissection or the procedures of the various types of partial neck dissection.

Radical neck dissection implies the complete removal of all lymph node-bearing tissue between the superficial subcutaneous fat and the fascia covering the deep muscles of the neck. The area of the dissection extends from the lower edge of the mandible and the mastoid into the supraclavicular space and to the clavicle; posteriorly from the anterior edge of the trapezius forward to the midline. Sometimes the dissection may [illegible] extend into the superior mediastinum [illegible] ally it entails the removal of the entire [illegible] muscle, the internal jugular [illegible] the submaxillary gland and any [illegible] may be involved by the [illegible] and partial resection or ligation of the [illegible] carotid artery.

Partial neck dissection [illegible] from a local submental or submaxillary [illegible]

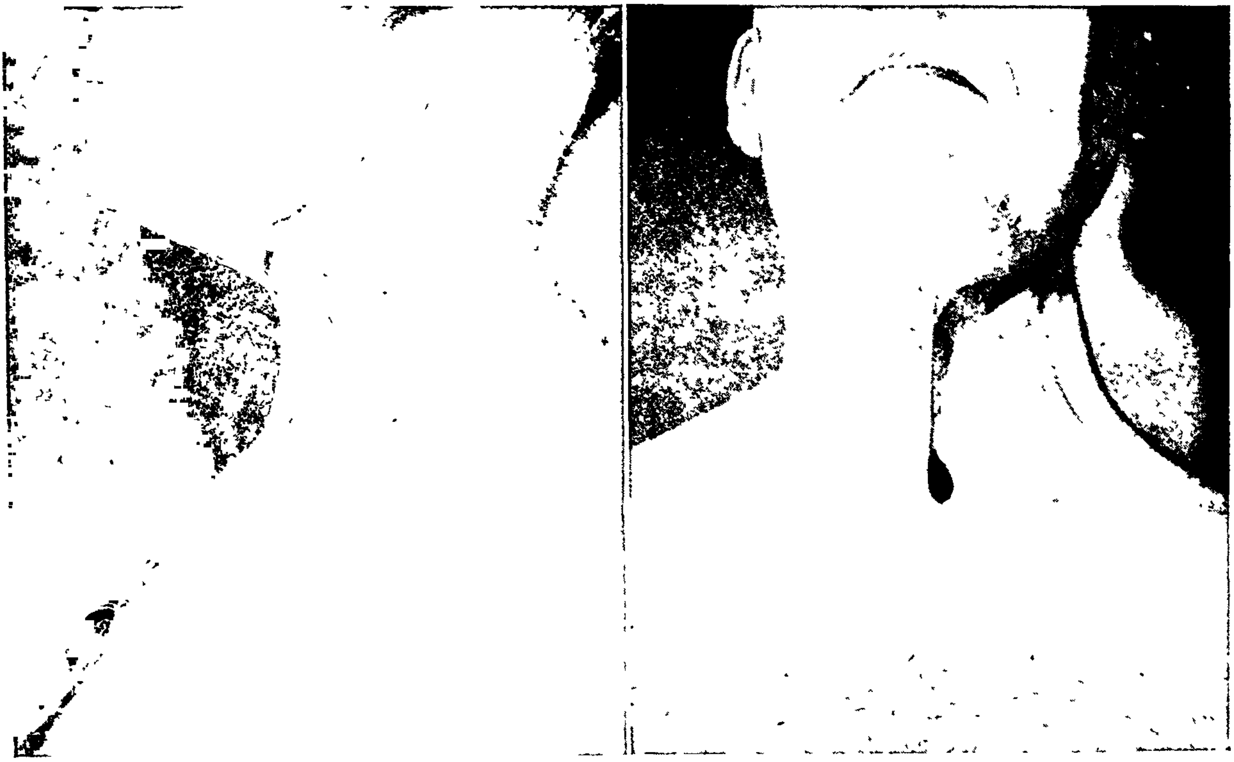

Fig. 2. F.S., squamous cell carcinoma, Grade III, of larynx with cervical metastases. With the cooperation of Dr. Chevalier L. Jackson, a combined laryngectomy and radical neck dissection was performed. The photographs show the appearance of the left neck and the laryngectomy stoma (right) after complete healing.

section to a suprahyoid or infrahyoid dissection. At our clinic, it is routine to have gold radon seeds available for all neck dissections in case the metastases are found perforating the capsule and infiltrating surrounding structures.

In the reports found in the literature the importance of local anesthesia is greatly stressed. Martin[6] lists a postoperative mortality of 1.5 per cent for local anesthesia and 14.3 per cent for general anesthesia. In 98 consecutive neck dissections performed by the author, one death occurred for a mortality rate of 1 per cent.*

The anesthetic of choice is selected after careful consideration of the condition of the patient and the anticipated difficulties of the operative procedure. We employ the following types of anesthesia for neck dissections:

1. Local, cervical block and avertin.
2. Local, cervical block and sodium pentothal, the latter being administered only if the patient is restless and at the time of dissection around the carotid bulb. In addition, each patient is given moderate preoperative medication consisting of atropine sulfate and 50 to 100 mg. of demerol.
3. Endotracheal intubation: nitrous oxide and ether or cyclopropane and intravenous sodium pentothal. Care is observed to deliver an adequate oxygen intake at all times.

RADIATION TREATMENT OF CERVICAL METASTASES

Cervical metastases treated by external irradiation alone are only occasionally cured. Where cervical metastasis was proved histologically and was treated by roentgen ray radiation alone, it is the exceptional case that remains well five years or longer (Fig. 3). C. L. Martin and Wright[5] state, "In our opinion cervical nodes containing squamous cell carcinoma cannot be cured with external irradiation alone because the carcinolytic dose

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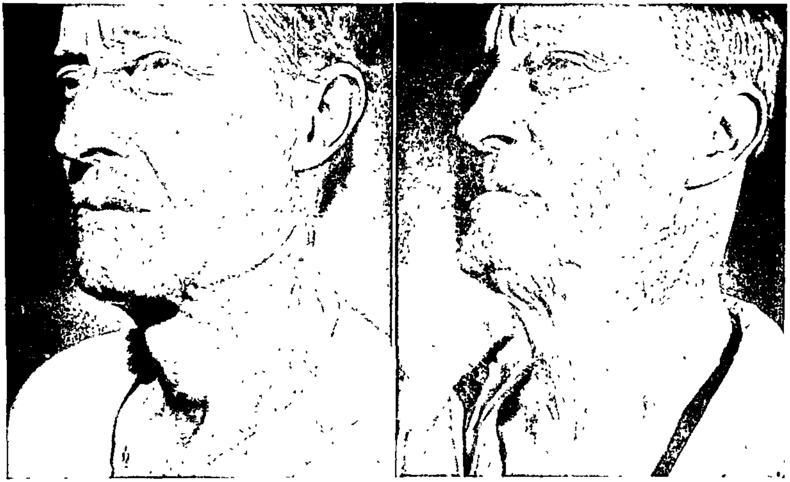
* [illegible] radical neck dissection which re- [illegible] and was performed [illegible] infiltration; intravenous [illegible] at the time of dis- [illegible] He was discharged from [illegible] postoperative day. Two [illegible] hematoma [illegible] multiple areas of [illegible]



July 25, 1941 May 8, 1946

Fig. 3. W.G., male, age 68. Admitted July 23, 1941, complaining of a lump in the neck of three months' duration. History otherwise noncontributory. In the left upper neck, just below the angle of the mandible, a fixed mass, 6x4x4 cm., was noted. It was adherent to surrounding structures. A smaller node, 1 cm. in diameter, was found just below the large mass. There was no other palpable adenopathy. A thorough physical examination failed to reveal any evidence of a primary lesion. X-ray of the chest was reported normal. Aspiration biopsy of the mass in the neck showed it to be a papillary squamous cell carcinoma, Grade II. From July 29, 1941 to Aug. 31, 1941 he received 250 r daily through a 9-cm. portal directed at the metastases, for a total dose of 3500 r, measured in air. No other treatment was given. Observed at two to four-month intervals since. Last seen on Sept. 4, 1947, at which time he had been free of disease over six years and to date no primary has been found. It is possible that this patient may have had a primary squamous cell carcinoma arising in a branchiogenic cyst.

for cancer in lymph nodes is considerably larger than that required for the primary lesion." They treat metastatic cervical nodes by simultaneously administering external roentgen irradiation utilizing the so-called Coutard technic and implanting radium in layers throughout the tumor. Their results in a group of 19 proved cases are 33 per cent three-year survivals.

Richards[14] reports on a group of 119 cases with cervical metastases from cancer of the tongue treated by radiotherapy with a three-year survival rate of 40 per cent. Hayes Martin[6] has reported 46 cases living and well five years or longer with proved metastatic cancer in cervical nodes treated by a course of external irradiation, administered in fractionated daily doses over a period of two to three weeks, for a total of 4,000 r to 8,000 r, depending on the size of the portal. Immediately on completion of the external radiation, radon seeds in a tissue dose of 5 to 10 S.E.D. (skin erythema doses) are implanted either through a puncture wound in the skin or after surgical exposure of the outer surface of the node. Blady and Chamberlain[1] reported end results of radiation treatment of cancer of the larynx from 1931 to 1937, and at that time concluded that "external irradiation alone is insufficient for control of metastatic cervical disease."

At Temple University Hospital Tumor Clinic and Radiation Therapy Department, the radiation treatment of cervical metastasis is by a combination of roentgen ray radiation and interstitial implantatio of radon. The

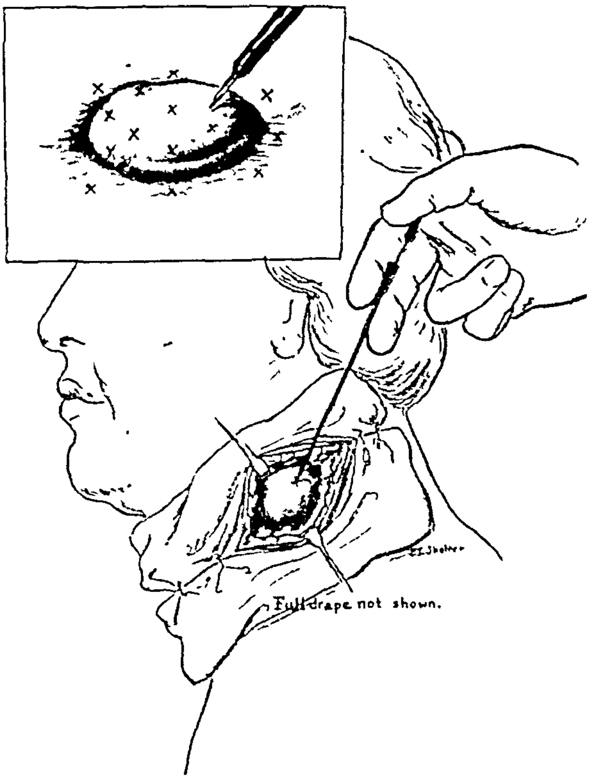


Fig. 4. Under local anesthesia the metastases in the neck are exposed and radon gold seeds are implanted as shown in the diagram (upper left). The tissue dosage is determined from Table IV.

roentgen ray radiation is given in divided doses through a portal adequate to cover the metastatic disease. The entire lymph node-bearing area of the neck is never irradiated. A tumor dose of at least 5,000 r is delivered. This is then followed by additional treatment which may be (1) implantation of radon gold seeds directly through the skin into the metastatic lymph node or nodes; (2) surgical exposure and implantation of radon gold seeds, or (3) neck dissection with or without (4) implantation of radon and whether there is a possibility of disease remaining in any of the regions.

PROPHYLACTIC NECK DISSECTION AND PROPHYLACTIC IRRADIATION

Since it is difficult to determine clinically in many instances whether metastases are present or not, the proper treatment of such cases has been the subject of much controversy.

The prophylactic treatment to the neck, it must be stated, can be of actual value only in those cases admitted without palpable metastases, in which the primary lesion was eventually controlled, and in which clinically demonstrable metastases appeared at a later date.

Analyzing the five-year survival statistics of Memorial Hospital,[7] Martin points out that in cancer of the tongue 40 patients were admitted without palpable cervical metastases in whom the primary lesion was permanently controlled. Five, or 12 per cent, later developed metastases. In other words, prophylactic neck dissection or prophylactic roentgen irradiation could have been a useful procedure in this group only. It would have been unnecessary in the remaining 35 patients and, unfortunately, could not be counted on to eradicate the metastases in the five who later did develop metastases in lymph nodes.

In cancer of the lip[10] 128 patients were admitted without palpable cervical metastases in whom the primary was permanently controlled. Of this group, 4, or 3 per cent, subsequently developed cervical metastases.

In cancer of the cheek 12 patients were admitted without palpable cervical metastases in whom the primary was permanently controlled. Of this group, 2, or 17 per cent, developed cervical metastases.

The hypothetical limits of the value of prophylactic neck dissection or irradiation, therefore, are indeed very small, as is demonstrated by these figures[7]

Taylor and Nathanson[15] reported on 247 patients with lip cancer without palpable lymph nodes, who were treated by excision of the primary lesion alone, with no primary treatment to the neck Later, a neck dissection was carried out in 25 patients because of the development of palpable nodes. Twenty proved to be histologically positive for meta-

TABLE 4. QUANTITIES OF INTERSTITIAL RADIATION NECESSARY TO DELIVER 1000 ROENTGENS IN VARIOUS VOLUMES FILTER 0.5 MM. PT.*

Diameter of Spherical Mass: Centimeters	1	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Volume of Mass: Cubic Centimeters	0.5	2	4	8	15	25	35	50	65	90	115
Milligram or millicurie hours to deliver 1000 roentgens	35	80	135	250	330	420	540	680	830	1000	1160
Millicuries destroyed to deliver 1000 roentgens	0.25	0.6	1.0	1.9	2.5	3.2	4.0	5.0	6.2	7.5	8.7

* Quimby, E. H.: Dosage Calculations in Radium Therapy, College of Physicians & Surgeons, Columbia University, New York City.

static cancer—8 per cent of the total group.

Kennedy[4] reported a series of 193 neck dissections in which 46, or 24 per cent, were histologically positive.

On the basis of the above data, one is impressed with the fact that prophylactic neck dissection can at best be useful in a relatively small group of cases. We do not advocate prophylactic neck dissection. It is our practice to have the patient observed at intervals of one month or less for the first year after treatment of the primary lesion, then increase the interval between follow-up visits to two and three months. In addition, the patient is fully acquainted with the facts of his disease, and advised to come for an examination immediately if any swelling occurs in the neck. Even the less intelligent patients, under these circumstances, have voluntarily cooperated.

Prophylactic irradiation of the neck, to be of any use, would require the irradiation of the entire neck node-bearing region with tumor doses of at least 3000 r to 5000 r. Doses under this amount can be of no benefit and therefore need not be discussed. The administration of a cancer-lethal dose to the entire neck, an area about 12 by 15 cm. in size, would be a major procedure and, in our opinion, unjustifiable. I have never observed a fatality due to irradiation of such a large area with a cancer-lethal dose. We do know, however, that the morbidity may extend over a period of from two to eight weeks.

Furthermore, we all realize that external irradiation alone will not completely obliterate or cure cervical metastases except in the occasional *highly malignant and radiosensitive* type of lesions.

The late radiation changes in the skin of the neck, which are inevitable after a cancer-lethal tumor dosage, add to difficulties when such a patient later develops metastases. Further irradiation in such a case, even if indicated, may result in very severe skin damage, which ultimately may require plastic procedures, or may give rise to serious complications, such as radionecrosis and sloughing.

In addition to these facts, the statistical data, as in the case of prophylactic neck dissection, limits the usefulness of prophylactic irradiation to an extremely small group of cases. *On this basis we never use prophylactic irradiation or neck dissection in the treatment of cancer of the oral cavity, naso-, oro-, or hypopharynx or larynx.*

TREATMENT OF CERVICAL METASTASES BY ANATOMIC REGION

As has already been pointed out, cervical metastases from different anatomic regions in the oral cavity, naso-, oro- and hypopharynx and from neck structures, vary in the lymphatic spread and, not infrequently, in histology. For this reason, no generalizations can be made which would cover the treatment of all metastases to cervical lymph nodes. The metastasis from cancer in each anatomic region renders itself to individualization according to certain accepted generalities.

Metastasis from Cancer of the Lip. About 29 per cent of the patients with cancer of the lip present metastases on admission. Another 8.5 per cent develop metastases after treatment of the primary lesion.[10]

Individualization in the selection of the treatment procedure is necessary. Inasmuch as a large percentage of cancer of the lip has enlarged palpable lymph nodes, a large proportion of which are inflammatory, it is imperative to prove the presence of metastases by biopsy before any treatment is considered.

When metastases are present at the time of admission, radiation therapy may be administered without particular risk at the same time and in conjunction with irradiation of the primary lesion. It is generally agreed that external irradiation should be supplemented by implantation of radon directly through the skin or after surgical exposure. In the series reported by Martin, MacComb and Blady,[10] 33 cases of proved cervical metastases were treated by interstitial implantation of radon alone. Of this group, 11 were free of disease five years later.

Neck dissection may be carried out as a one-stage procedure at the time of the surgical excision of the cancer of the lip, especially if the metastasis is limited to the submental and submaxillary regions. When the cancer of the lip is an extensive growth and requires a formidable surgical procedure, it is preferable to wait until the patient has fully recovered from this procedure before proceeding with the neck dissection.

When the metastasis occurs after the primary disease has been controlled, then a partial or radical neck dissection is indicated.

Metastasis from Cancer of the Cheek. The incidence on admission is about 40 per cent, and an additional 8 to 15 per cent develop metastases later in the course of the disease. Histologically, cancer of the mucous membranes of the cheek usually is a well-differentiated epidermoid variety of tumor, and for this reason metastasis tends to occur rather late in the course of the disease.

The treatment for neck nodes on admission can either be by neck dissection or by a combination of external irradiation and interstitial implantation of radon. If the treatment of the primary lesion is by one of the radiation methods, the treatment of the metastases can be carried out simultaneously by external irradiation. The size of the portal should be large enough to cover adequately the size of the lesion. A tumor dose of at least 5000 r is delivered to the metastases, followed by implantation of radon seeds in a tissue dosage of 5000 to 10,000 gamma roentgens. At our clinic we not infrequently follow up the external irradiation with a partial neck dissection and implantation of radon into the tumor bed and in the adjacent areas of lymphatic drainage.

Where the treatment of the primary is by surgical excision, we usually combine this procedure with a neck dissection; if too extensive, the neck dissection is performed within a period of one to two weeks after the treatment of the primary.

For metastases developing after successful treatment of the primary, we advocate neck dissection.

Metastases from Cancer of the Tongue. The incidence of cervical metastases from cancer of the tongue on admission is about 39 per cent. An additional 24 per cent subsequently develop metastases, making a total of about 63 per cent that have metastases sometime during the course of the disease.[11]

In those cases in which the primary lesion is being treated by radiation, the treatment of the metastases should be limited to the individual nodes themselves and not to the entire neck region, unless there is extensive involvement. Immediately after completion of the external irradiation, additional treatment in the form of interstitial implantation of radon is necessary. The implantation of radon gold seeds may be made directly into the metastases through puncture wounds in the skin or, preferably, for more accurate distribution of the implants, by surgical exposure of the node. A tissue dosage of 5000 to 10,000 *gamma roentgens should be delivered. In the* presence of large, bulky metastases, it may be desirable to excise the metastases locally and to implant gold radon seeds in tissue doses of from 8000 to 12,000 gamma roentgens into each region of the neck which is involved.

In the cases where the primary lesion is removed surgically, a combination neck dissection may be carried out at the same time if the general condition of the patient does not contraindicate such extensive surgical procedures.

Where the metastases appear after the primary has been successfully treated, the treatment of the cervical metastases is by radical neck dissection. The following conditions have been suggested as indications for neck dissection:[3, 11]

1. Metastatic cancer should be palpably demonstrable in the neck, and proved histologically.
2. The primary lesion should be healed and show no recurrence.
3. The primary lesion should neither have involved nor crossed the midline.
4. The metastases should be operable from the standpoint of location and mobility in the tumor bed.
5. The metastases should be unilateral and on the same side as the primary lesion.
6. The patient's general condition should be such as to be able to withstand the operation.

If the case does not conform to all these conditions, the patient's chances of cure probably are better under a combination treatment by external radiation supplemented by interstitial implantation of radon gold seeds.

Metastases from Cancer of the Floor of the Mouth. About 32 per cent have metastases on admission, and another 20 per cent develop metastases after treatment of the primary growth. The five-year survival rate, as reported by Martin, is 29 per cent in the group without cervical metastases, and 22 per cent in the group with metastases.[12]

The indications described for the treatment of metastases from cancer of the tongue should be observed in the treatment of metastases to lymph nodes in the neck from cancer of the floor of the mouth.

Metastases from Cancer of the Tonsil. Reports from the literature indicate that metastases from cancer of the tonsil and oropharynx may occur in from 65 to 92 per cent of the cases. Martin and Sugarbaker reported in 1941 on a series of 157 unselected consecutive cases of cancer of the tonsil seen at the Memorial Hospital. Of this group, 76 per cent of the cases had metastases on admission, and another 3 per cent subsequently developed metastases. For the group without metastases on admission, the five-year survival rate was 38 per cent, and for the group with metastases on admission, only 8 per cent. An interesting observation was the presence of bilateral metastases in about 14 per cent of the group with metastases.

The histology of the tumors of the tonsil and oropharynx shows a high incidence of anaplastic varieties of epidermoid carcinoma, lymphosarcoma and lymphoepithelioma. This fact plays an important part in the selection of a treatment modality for the metastases.

Because of the fact that metastases from the tonsil frequently occur in the subdigastric nodes, it is frequently possible to treat both the primary lesion and the metastases through the same portal. When the metastases occur in the upper deep cervical regions, a larger portal may be required to cover both the primary lesion and the metastases. Where the nodes are widely separated, multiple portals, adequate in size to cover the individual nodes, should be employed. A minimal tumor dosage of 5000 r is delivered, and this is supplemented by interstitial implantation of radon. For nodes lying superficially, the implantation may be directly through the skin; otherwise, it is preferable to expose these nodes surgically. A tissue dose of about 5000 to 10,000 gamma roentgens should be delivered.

For cervical metastases occurring later in the course of the disease and after the primary growth has been controlled, neck dissection may be employed in selected cases and only after thorough investigation to rule out more distant metastases. Where large metastases are present, it may be highly desirable, in the management of the disease, to perform a radical neck dissection and implant radon seeds. In order to get a uniform and cancer-lethal dose, it is necessary to deliver from 8000 to 10,000 gamma roentgens to each region of the neck, along which lymphatic spread is likely to occur. In our experience this has been an extremely valuable palliative procedure. In some of these cases, no further metastases appeared for a period of one to two years. Death, in these cases, was due to recurrence and local complications of the primary lesion.

Metastases from Nasopharyngeal Cancer. On admission 77 per cent have cervical metastases; another 4 per cent develop metastases later in the course of the disease.[8]

In cancer of the nasopharynx, we are dealing with a highly malignant anaplastic, radiosensitive growth which tends to metastasize early and widely to both sides of the neck. The problem of treatment, therefore, is one of employing adequate irradiation. Cervical metastases from cancer of the nasopharynx can be permanently controlled by radiation. Death in these patients is due either to local extension of the nasopharyngeal disease or to distant metastases. Neck dissection is of little practical value in the treatment of metastases from the nasopharynx. Surgical exposure for more accurate implantation of radon, however, is definitely indicated.

TABLE 5. ANALYSIS OF TREATMENT OF CERVICAL METASTASES FROM CANCER OF LARYNX: 1930–1941 INCLUSIVE †

Treatment	Cases	D.O.D.	D.O.C.	N.E.D.
X-ray	22	21	—	1*
X-ray plus radon	1	1	—	—
Surgery	1	—	—	1
Combination of surgery, x-ray and or radon. .	7	3	1	3

* Reticulum cell lymphosarcoma.
† From Blady, J. V.: Am. J. Roentgenol., 58:331, 1947.

Metastases from Cancer of the Intrinsic and Extrinsic Larynx and Hypopharynx. Metastases are infrequent in cancer of the intrinsic larynx. In an analysis of 156 cases, only 13, or 8 per cent, had metastases on admission, while another 16, or 10 per cent, developed metastases later in the course of the disease.[1]

At Temple University Hospital prior to 1939, cervical metastases from cancer of the larynx were treated by external irradiation alone. There were no survivals.[1, 2]

Since 1940 the treatment of cervical metastases from cancer of the intrinsic and extrinsic larynx in our Tumor Clinic has been as follows: (1) For patients presenting metastases on admission, roentgen treatment is employed for treatment of the primary in the larynx and, if possible, the metastases are incorporated in the same portal. If not, an additional portal is employed. Following the irradiation, either before the severe radiation epitheliitis develops, or after it has completely healed, the metastases are surgically exposed and radon is implanted in a tissue dosage of 5000 to 10,000 gamma roentgens, or a neck dissection, with or without the implantation of radon, is performed; (2) for metastases occurring after the primary disease has been controlled, a neck dissection is performed. Radon is implanted when there is a perinodal infiltration. In this group radiation alone is never used in the treatment of metastases.

Metastases from Cancer of the Skin of Face and Neck. The epidermoid variety of cancer of the skin is a well differentiated tumor and only rarely—and usually late in the course of the disease—does one encounter a metastasis at the time the patient seeks medical attention. In such cases, the treatment should be by wide surgical excision of the primary lesion and, if the metastatic nodes are close to the primary, the lymphatics and the nodes should be removed in continuity. If not, the treatment of the primary may be either by radiation or surgery, while the treatment of the metastases should be by neck dissection with or without the implantation of radon.

In cases of metastases occurring after treatment, and where the primary lesion has been controlled, a neck dissection is indicated.

The treatment of cervical metastases from a melanoma is by a thorough radical neck dissection, preferably in continuity with the primary lesion. Radiation is of no value in the treatment of metastases from a malignant melanoma.

ANALYSIS OF RESULTS

In the period from 1940 to 1946, a total of 87 patients with cervical neck metastases in the Tumor Clinic of Temple University Hospital was treated by neck dissection. A total of 116 procedures, consisting of a radical or a partial neck dissection with or without the implantation of radon, surgical exposure of metastases and implantation of radon, and surgical exploration, was performed on these 87 patients. Six patients received treatment for bilateral neck metastases. One procedure was performed in 67 patients; two procedures

TABLE 6. ANALYSIS OF LOCATION OF PRIMARY LESION

Larynx	27
Tongue	12
Piriform sinus	7
Tonsil	6
Undetermined primary	5
Floor of mouth	5
Oropharynx	4
Lip	3
Salivary gland	3
Upper and lower gingiva	3
Thyroid	3
Melanosarcoma (skin of head and face)	2
Epiglottis	1
Hypopharynx	1
Nasopharynx	1
Nose	1
Buccal mucous membrane	1
Breast	1
Antrum	1
Total	87

TABLE 7. NECK DISSECTIONS FOR CANCER JAN. 1, 1940 TO JAN. 1, 1942 *

Site of Cancer	Total No. of Cases	Five-Year Survivals	Died of Other Causes
Larynx	11	4	1
Piriform sinus	4	2	0
Tonsil	2	0	0
Alveolar ridge	2	0	0
Tongue	1	0	0
Salivary gland	1	0	0
Soft palate	1	0	0
Floor of mouth	1	0	0
Lip	1	0	1
Totals	24	6	2
Five-year Survivals		6	
Net five-year survival rate (6/24)		25 per cent	

* In all cases metastasis was proved histologically.

in 15 patients; three procedures in four patients and four procedures in one patient.

The most common anatomic sites for the primary disease in this group of cervical metastases were larynx, tongue, piriform sinus and tonsil (Table 6).

A five-year survival analysis may be reported on the three-year period from 1940 to 1942, during which time a total of 24 patients was treated. Of this group, 16 died of their disease; 2 died of other causes * without evidence of recurrent or metastatic cancer, and 6 have survived five years or longer. Inasmuch as the two patients dying of other causes did not survive their disease longer than one year, statistically they are being considered as failures of treatment. The five-year survival for this group of 24 patients is 25 per cent.

SUMMARY

The importance of "a lump in the neck" is stressed, as it may be the first sign of a cancer elsewhere in the body.

In an analysis of 1290 cases of malignant neoplasms of various anatomic regions of the body, cervical metastases were present in 13.5 per cent of the cases. Fifty-three per cent of the cervical metastases were associated with primary growths in the head and neck regions, and 30 per cent in lymphoblastomas.

The treatment of cervical metastases by neck dissection and by radiation methods, and the indications for these methods are presented. Treatment of cervical metastases from cancer arising in the lips, cheeks, tongue, floor of the mouth, tonsil, oropharynx, nasopharynx, intrinsic and extrinsic larynx, hypopharynx and the skin of the face and neck is discussed.

From 1940 to 1946 a total of 87 patients with cervical metastases was treated by neck dissection. In the cases treated from 1940 to 1942 the five-year survival rate is 25 per cent.

SOMMAIRE

L'importance "d'une plaque dans le cou" est souvent le premier signe d'un cancer situé dans une autre partie du corps. Dans une analyse de 1290 de néoplasmes malignes de différentes parties du corps, on rencontra des métastases cervicales dans 13.5% des cas. 53% des métastases étaient associées avec des

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* One patient died of peritonitis following an operation for a strangulated hernia, and the other from cancer of the stomach.

tumeurs primaires de la tête et du cou et 30% avec des lymphoblastomes. Le traitement des métastases cervicales par la dissection du cou et par l'irradiation est indiqué. Les emplois de ces méthodes sont discutés. Le traitement de métastases cervicales cancéreuses des cancers ayant leur origine aux lêvres, aux joues, à la langue, au plancher de la bouche, dans l'oropharynx, dans le nasopharynx, dans l'hypopharynx, dans la peau de la figure et du cou est la base et l'étude de nombreuses recherches.

De 1940 a 1946, un total de 87 malades avec métastases cervicales furent traitées par la dissection du cou. Dans les cas traités de 1940 a 1942, il y eut une survivance de cinq ans de 24%.

SUMARIO

El autor discute la importancia de las tumefacciones de la region del cuello y llama la atención de que frecuentemente son el primer indicio de la existencia del cancer en otras regiones del cuerpo.

En una serie de 1290 casos de tumores malignos en diferentes regiones del cuerpo los autores encontraron metastasis en el cuello en 13.5% de los cuales 53% fueron debidos a tumores primarios de la region de la cabeza o del cuello mismo y 30% a linfoblastomas.

También se discute los diferentes metodos quirurjicos en el tratamiento de estos tumores, incluyendo la disección radical y la radioterapia.

En los años del 1940–1946 un total de 87 casos de tumefacciones metastaticas del cuello fueron tratados por la disección. De estos casos, los tratados del 1940 al 1942, 24% hen sobrevivido mas de cinco años.

RIASSUNTO

L' importanza di un nodulo nel collo viene sottolineata quale segno iniziale di un cancro metastatico. Le metastasi cervicali arrivano infatti nella statistica dell'A.—comprendente 1290 tumori maligni degli organi piu' svariati —ad una percentuale del 13,5%. La percentuale si eleva al 53% nei tumori maligni della testa e del collo: al 30% nei linfoblastomi.

L'A. discute il trattamento chirurgico e radioterapico di queste metastasi.

L'asportazione dei noduli cervicali comprende—nell' intervallo dal 1940 al 1946—87 casi. La percentuale di sopravvivenza dopo 5 anni (nei casi curati dal 1940 al 1942) arriva al 24%.

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Nonfunctioning Gallbladder*†

WILLIAM BATES, M.D., F.A.C.S., F.I.C.S., AND GORDON KING, M.D.
PHILADELPHIA, PENNSYLVANIA AND JACKSONVILLE, FLORIDA

FAILURE to demonstrate stones radiographically in cases giving clinical evidence of chronic cholecystic disease has presented problems of interpretation and of treatment. Two groups of such cases are found. In one group the radiologist must consider his studies as within normal limits. The second group shows either a very poor gallbladder shadow or no shadow even after repeated attempts to concentrate the "dye" by oral or intravenous methods. This discussion will be concerned with the second group of cases commonly described as nonfunctional gallbladders.

Because these cases were reported by the roentgenologist as nonfunctioning gallbladder, we felt we must know just what that term meant as compared with our surgical findings.

Two hundred cases of chronic cholecystitis which had been subjected to surgery were studied to determine the incidence, pathology, operability, and other factors related to those cases in which the gallbladder had been very poorly or not at all visualized, and in which there were no opacities suggesting gallstones radiographically. The report of a satisfactory study by a competent radiologist, a report of operative findings, and a report of pathologic findings was required of each case accepted in the series. The series is unselected except for these three requirements.

As a result of our comparison of x-ray report with our surgical and pathologic findings, we are convinced that others are correct when they contend that a report of a nonfilling or nonconcentrating gallbladder implies considerable pathology in the biliary tract. Such a condition obtains only with considerable destruction of the gallbladder histology and function so that dye entering the viscus is not concentrated enough to cast a shadow; or when dye is not entering the gallbladder occurs with various obstruction of the cystic duct, or with obliteration of the cavity of the bladder by tumors, stones, inflammatory changes, or very rarely because of congenital absence of the gallbladder. Thus, the gallbladder which cannot be visualized as well as the gallbladder showing filling defects or opacities must be considered to have advanced pathologic changes present.[7] Judd states that positive x-ray evidence indicating pathologic change in the functions of the gallbladder is reliable in as high as 97 to 98 per cent of the cases.[3] No case in this series failed to show advanced pathology. One case too recent to include in the series proved to have congenital absence of the gallbladder as an explanation for the nonvisualized cholecystograms. It must be admitted that clinical evidence of cholecystic disease in this case was far from decisive, and that it was well realized prior to surgery that functional factors were largely responsible for the patient's symptoms.

Some investigators have indicated that various extrabiliary conditions may affect the filling and emptying of the gallbladder.[2,6] Peptic ulcer, pernicious anemia, thyrotoxicosis, myxedema, diabetes mellitus, obesity, tuberculosis, chronic appendicitis, and poor excretion of the dye by the liver have been mentioned as contributing to error in cholecystographic studies. Good and Kirklin studied these conditions in regard to possible error, and concluded that one is not likely to be misled in a careful examination.[1,4] Such errors did not appear in this series of cases. In fact, failure to visualize the gallbladder carried an ominous message of advanced pathology, prolonged hospitalization, difficult surgery, and increased mortality.

All cases not visualized after routine oral ingestion of gallbladder dye were studied after "intensified oral technic" of administration. Frequently this was followed by a satisfactory visualization with demonstration of stones and other defects of the gallbladder. If no gallbladder shadow could be demonstrated after the "intensified oral technic" the intravenous route of administration was employed. Thus, all cases in the nonfunctioning group of this series had been studied by the intravenous method, but in no case did intravenous studies show a shadow if the intensified oral method had failed to show a dye concentration in the gallbladder.

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† From the Department of Surgery, Graduate Hospital, University of Pennsylvania.

In the experience of one of us (Bates) there was a case where double oral administration proved negative and intravenous method showed a normally functioning gallbladder. This was a young man in the early twenties with so little clinical indication of gallbladder disease that repeated studies were performed. Biliary drainage showed normal clear "B" bile Seven years have passed since those studies and the patient is still free of any suggestive gallbladder symptoms.

Eighteen of the 200 cases of chronic cholecystitis fell in the nonfunctioning or nonfilling group—a general incidence of 9 per cent. The average age was 51 years with about equal distribution in each decade from 30 to 70 years of age There were 4 males and 14 females (Table 1)

TABLE 1 INCIDENCE

Number of cases of chronic cholecystitis reviewed	200
Number of cases in the "Non Functioning" group without demonstrable opacities or shadows . . .	18
Incidence of the Non-Functioning Gallbladder	9%
Males, 4 Females, 14	
Age Incidence, Average	..50.9 Years
Less than 20 years of age	1
20 to 30 years of age	0
30 to 40 " " "	4
40 to 50 " " "	4
50 to 60 " " "	3
60 to 70 " " "	1
Over 70 " "	2
Total	18

TABLE 2. MORBIDITY AND MORTALITY.

Time in Hospital:	Cases
Less than 15 days.	2
15 to 30 days stay.	8
Over 30 days stay.	8
Average 26 days for all cases	

Mortality:		
6 deaths in the series of 200...	3%	mortality
3 deaths in the nonfunctioning group.	15%	"
Contribution of this group's deaths to over-all mortality rate.	50%	

Three cases died, giving a mortality rate of 15 per cent for the group of 18 cases. Since there were only 6 deaths in the entire series of 200 (3 per cent), deaths in the nonfunctioning group contributed 50 per cent to the over-all mortality rate. One case succumbed to uremia and cardiac failure on the twelfth postoperative day; one died on the twentieth day of hypertensive heart disease, septicemia, and subhepatic abscess; and the third expired on the fifty-fifth day after two surgical attempts to correct a postoperative biliary fistula. Recorded postoperative complications included urinary retention requiring suprapubic drainage (1 case); pulmonary atelectasis (1 case); superficial wound infection (1); and the biliary fistula mentioned above which finally terminated fatally.

This man came to us after six months of complete severance of the common duct at the level of the cystic duct In spite of the fact that a piece had been removed, the cut ends were open and a trickle of bile occasionally reached the duodenum Unfortunately the first attempt at repair was unsuccessful, and a second attempt was followed by a cardiac death

Exploration of the common duct is carried out in some clinics in 50 per cent of the cases undergoing cholecystectomy. This surgical service has felt that only strong indications of common duct pathology justify the procedure It is therefore significant that 6 of the 18 cases were subjected to exploration of the common duct, indicating the advanced pathology found at operation. No case of nonfilling or nonfunctioning gallbladder in this series failed to show advanced pathology. Three cases showed chronic inflammatory changes, thickening of the wall, areas of hemorrhage, scarring, and destruction of the mucosa. The other 15 cases showed all of these changes, and in addition these gallbladders contained nonopaque stones of various types. One case in addition to showing such pathology of the gallbladder, had a suspicious thickening of the head of the pancreas. In this case the gallbladder was evacuated of its stones, and a cholecystjejunostomy was performed. The jaundice cleared rapidly, and a five-year follow-up failed to give evidence of carcinoma or other significant difficulties.

Symptoms encountered in these cases of nonfunctioning gallbladder do not vary greatly from those found in other cases of chronic cholecystic disease. Findings are reviewed in detail in Tables 3 and 4. Upper abdominal distress, especially to the right of the midline is the most common chief complaint, and radiation to the back, shoulders, and sternum the most frequent associated complaint. Tenderness over the gallbladder area is the most frequent physical finding. Nausea, vomiting, and constipation occur in a third of the cases but, surprisingly, fat intolerance, belching, and flatulence do not appear as prominently as we might expect. Jaundice was noted in 7 cases. Duration of symptoms is tabulated in Table 5. Eleven cases had symptoms for more than a year while 7 denied symptoms of long duration. Perhaps certain features of hospitalization insurance may contribute to histories of short duration. Most patients, however, could recall symptoms of significance over a period of at least five years. One fourth of the patients had lost significant amounts of weight, and this had usually been noticed during the preceding six months.

TABLE 3.

Chief Complaints	Cases
Pain in right upper abdomen	9
Pain in epigastrium	3
Vague abdominal discomfort	3
"Indigestion"	2
Severe and typical colic	1

TABLE 4.

Associated Findings and Complaints	Cases
Tenderness over gallbladder area	11
Jaundice	7
Nausea	7
Vomiting	6
Constipation	6
Relation of pain to meals	4
Recent chills and fever	3
Frequent belching	3
Abdominal fulness	3
Excessive flatus	2
Intolerance to fatty foods	2
Weight loss during past six months (29, 21, 40, 13 and 25 pounds lost)	5
Radiation of Pain	
To lumbar portion of back	7
To either shoulder or scapulae	6
To sternum or substernal area	4

TABLE 5.

Duration of Symptoms	Cases	
Under 1 year:		
2, 6, and 9 months	3	7
2, 3, and 3 weeks	3	
6 days only	1	
Over 1 year:		
1 year	1	11
2 years	1	
3 years	2	
5 years	5	
6 years	1	
7 years	1	

The existence of certain associated diseases was investigated. Half of the patients were considered obese. Evidence of cardiac disease was found in 7 patients, and hypertension was present in 4 cases. All of the women gave a history of one or more pregnancies carried to term. The role of recent infections was not outstanding, but in two instances this was apparently a factor in the exacerbation causing hospitalization.

Intraduodenal tube drainage of the gallbladder as a means of diagnosing cholecystic pathology finds additional support in this series of cases. While the procedure was carried out in only three of the nonfunctioning cases, the diagnosis was indicated in each instance since no "B" bile could be recovered.

The follow-up records of all 15 surviving cases indicated good response to surgical treatment. Only one case was readmitted for similar complaints; study revealed that most of his symptoms were now due to air-swallowing augmented by psychogenic factors. He improved remarkably after help in correcting these difficulties. No case presented any serious or prolonged problems after leaving the hospital.

Though this is too small a number of cases from which to draw definite conclusions, it has convinced the authors that a report of nonfunctioning gallbladder by a good roentgenologist means definite gallbladder or duct disease.

SUMMARY

1. Two hundred surgically treated cases of chronic cholecystic disease have been reviewed to determine factors relating to cases in which the gallbladder could not be visualized radiographically, and in which no opacities suggesting stones in the gallbladder could be emonstrated.

2. In no case in this series did intravenous administration of the dye give visualization of the gallbladder if visualization had not been obtained after "intensified oral administration" of the dye.

3. A competent radiologist's report of a nonfunctioning or nonfilling gallbladder carries with it the implication of advanced pathology, increased morbidity, dificult surgery, and i[illegible]d mortality. In all cases of nonfun[illegible]llbladder in this series advanced p[illegible] demonstrated at [illegible]ation.

[illegible]ollow-up [illegible]te that good [illegible]ter [illegible] may be [illegible]e non-

biliaire ne soit pas visualisée radiographiquement et dans laquelle aucune opacité de calculs biliaires ne soit présentée.

Dans aucun cas de cette sorte, l'administration intraveineuse de colorant n'obtient la visualisation de la vésicule biliaire quand la visualisation n'a pas été obtenue après l'administration orale intensive du colorant.

Quand un radiologiste compétent fait un rapport d'une vésicule biliaire nonfonctionnante ou nondistensible, cela sûggége un état pathologique avancé, une augmentation de morbidité, une chirurgie difficile, et une haute mortalité. Dans tous les cas de cette serie ou la vesicule biliaire ne fonctionnait pas, on constata à l'opération un état pathologique avancé.

Les malades observés après leur depart de l'hopital nous permettent de dire que le traitement chirurgical de la vésicule biliaire nonfonctionnante donne de bons résultats.

SUMARIO

El autor hace una revista de 200 casos de colecistitis cronica tratados quirurjicamente con el objeto de determinar los factores relacionados con aqueyas vejigas que no fue posible visualizar radiograficamente.

En esta serie ningun caso pudo ser visualizado con el agente radio-opaco cuando se uso por la via intravenosa si habia antes fracazado por la via oral cuando se dio por el metodo de administracion oral intensificado.

El reporte del radiologo que indica una vejiga que no se visualiza o que no funcione lleva la implicacion de una patologia avanzada, un aumento de la morbilidad, mayor [illegible]ificultad para el cirujano durante la opera[illegible]n y por consiguiente mayor mortalidad. [illegible] todos los casos en que el examen radio[illegible] mostro una vejiga que nofuncionaba [illegible]racion siempre demostro una patologia [illegible]da.

[illegible]stos casos la cirujia ha probado dar [illegible]esultados.

RIASSUNTO

[illegible]zioni cliniche dedotte da duecento [illegible]istite cronica, nei quali la vesci[illegible]re non era visibile radiologica-

mente e nei quali non esistevano opacita' riferibili a calcoli.

La visualizzazione della viscichetta biliare non e' stata possibile se non dopo un'intensificata sommistrazione perorale del mezzo di contrasto.

La diagnosi da parte di un competente radiologo di una vescichetta biliare non funzionante implicherebbe—in base al controllo operatorio—delle lesioni gravi, un intervento operatorio piu' difficile, e con cio', una morbilita' ed una mortalita' postoperatoria piu' elevata.

La cura chirurgica di questi casi offrirebbe —a distanza di tempo—degli eccellenti risultati.

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New Method of Esophagoplasty

G. M. MES, F.R.C.S.
KRUGERSDORP, TRANSVAAL, SOUTH AFRICA

THE problem of devising a procedure for esophagoplasty which will be successful functionally is a continuing challenge to surgeons. The fact that other workers have been unable to equal the results reported by Yudin suggests that his procedure, too, is not the answer. The failure of currently employed procedures to meet the requirements prompts publication of the present paper.

The four source materials from which the gastroesophageal tube may be made are *skin* (Bircher), *jejunum* (Wullstein, Lexer, and others), *large intestine* (Kelling, Vulliet, Rioth) and *stomach* (Kirschner). Each has its disadvantages. With skin there is a tendency to fistula formation. Jejunum was not designed by nature to stretch longitudinally and, suffering from insufficient blood supply, more tubes made from it have died than lived. The disadvantage about the large intestine, especially before the advent of sulfonamides and penicillin, was the infectiousness of its contents. The disadvantages to use of stom[illegible] The magnitude of the [illegible] anastomosis to [illegible] [illegible] diaphragm, and th[illegible] [illegible] the fact [illegible] very [illegible] not [illegible]

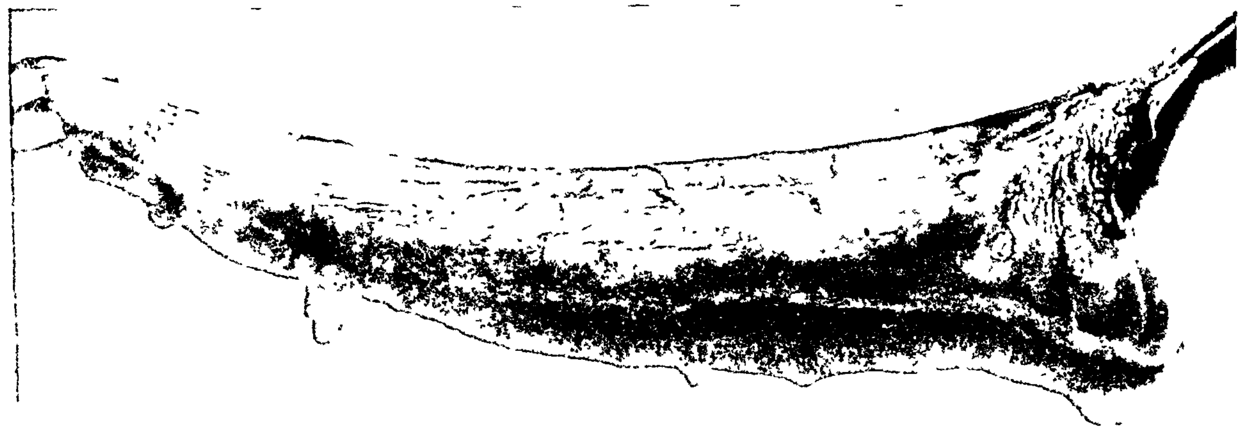


Fig. 1. Stomach of man practically starved to death.

The lesser curvature of the stomach seems designed to support the stomach between the esophageal hiatus and the portia hepatis. The greater curvature, however, has been designed to accommodate the sudden influx of food and to hold it until it can be fed piecemeal into the intestine for digestion. The lesser curvature, therefore, is the part that prevents sufficient stretching of the Kirschner tube, not the stomach as a whole.

How far this stretching of the greater curvature can go is well demonstrated by the accompanying illustration. Figure 1 shows the stomach of a man practically starved to death; Figure 2, the amount of tube available by the Kirschner method; and Figure 3 the amount of tube available if the lesser curvature is excised and the greater curvature sewn under stretch. In the body from which this specimen was taken it reached to the top of the head.

Beyond this there is, in the fundus, a piece of potential tubing in the "return" part between the cardia and the apex of the dome of the fundus where Kirschner and those practicing intrathoracic esophagoplasty place their esophagogastrostomies (Fig. 4).

The blood supply of the greater curvature is ideal. The experiences of Beck, Jianu and Halpern with tubes based on the fundus,

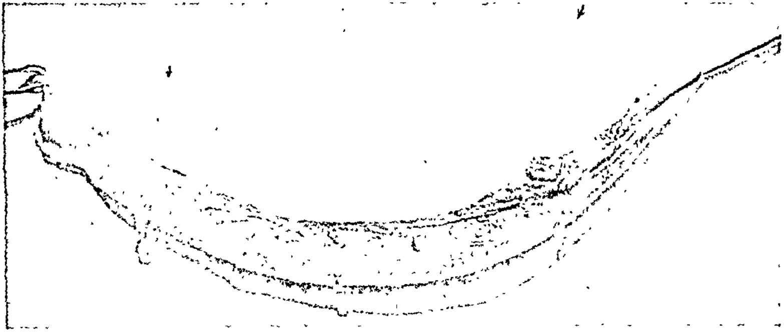


Fig. 2. *Amount of tube available by Kirschner method.*

tubes that were fed *through* the arterial anastomosis of the fundus, made it likely that this anastomosis would at least be able to feed its own area. This proved to be true.

Three procedures are available:

1. Simple excision of the lesser curvature in all those cases where the stomach is not long enough to reach into the jugulum and proceed with the rest of the operation as described by Kirschner.
2. The lesser curvature can be left attached to the cardia, sewn into a tube and anastomosed lower down with a loop of the intestine
3. The tube can be left attached to both cardia and pylorus, forming a drain for esophageal secretions when sewn into a tube.

The goal, then, was to slit the stomach from the fundus just above the cardia to the middle of the pyloric antrum.

Since there is no way by which clamps can be applied to the fundus the operation is started by making a buttonhole through the pyloric antrum and applying the clamps upward with one blade through this hole and the other along the anterior surface of the stomach. To eliminate simple suture over or in front of a clamp, which would have impeded instead of assisted the stretching of the tube of greater curvature, forming a fixed suture line, a temporary tacking stitch to control hemorrhage and prevent unnecessary soiling of the peritoneum had to be the solution, and therefore split clamps had to be used.

TECHNIC

Incision. A vertical incision was used in all cases from the xiphisternum to beyond the umbilicus on the right. At the top, a transverse 2-inch incision was added, running to the left and severing the upper attachment of the rectus, thus preparing the opening for the stomach tube (Fig. 5).

Adhesions were separated by blunt dissection until a finger could be hooked around the gastrostomy inside the abdomen. With the scalpel, keeping close to the inside of the posterior rectus sheath, the gastrostomy was easily divided and the opening in the stomach brought into the wound where it was temporarily closed by a few tissue forceps.

Orientation. (1) The placing of the gastrostomy opening in relation to the greater and lesser curvature is defined. The buttonhole must be placed nearer the lesser curvature and, as the old gastrostomy opening is the logical opening for the anterior part of the buttonhole, its suitability for that purpose must be studied. (2) The gastroepiploic artery is found and followed up to see if it will be able to feed the tube. Where abnormal conditions of this artery are present other methods must be employed.

The greater curvature and fundus are carefully liberated, vessels ligated and sutured, particular care being taken to identify and ligate the short gastric artery at the upper pole of the spleen or in the gastrodiaphrag-

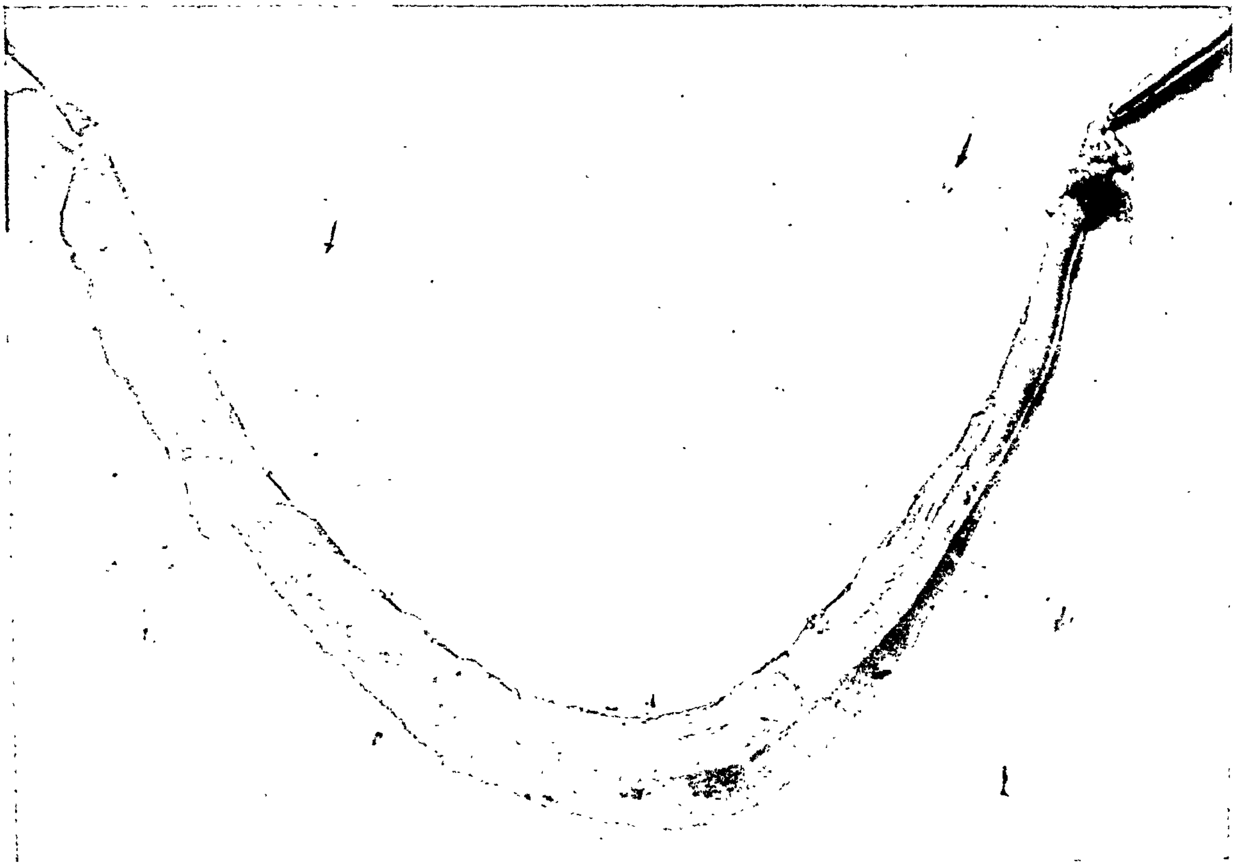


Fig. 3. Amount of tube available by sewing greater curvature under stretch.

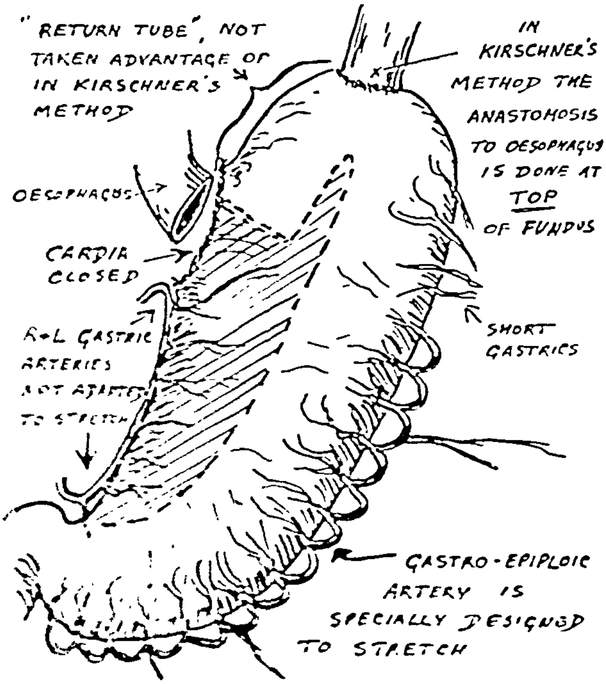

"RETURN TUBE", NOT TAKEN ADVANTAGE OF IN KIRSCHNER'S METHOD
OESOPHAGUS
CARDIA CLOSED
R+L GASTRIC ARTERIES NOT ADAPTED TO STRETCH
IN KIRSCHNER'S METHOD THE ANASTOMOSIS TO OESOPHAGUS IS DONE AT TOP OF FUNDUS
SHORT GASTRICS
GASTRO-EPIPLOIC ARTERY IS SPECIALLY DESIGNED TO STRETCH

Fig. 4.

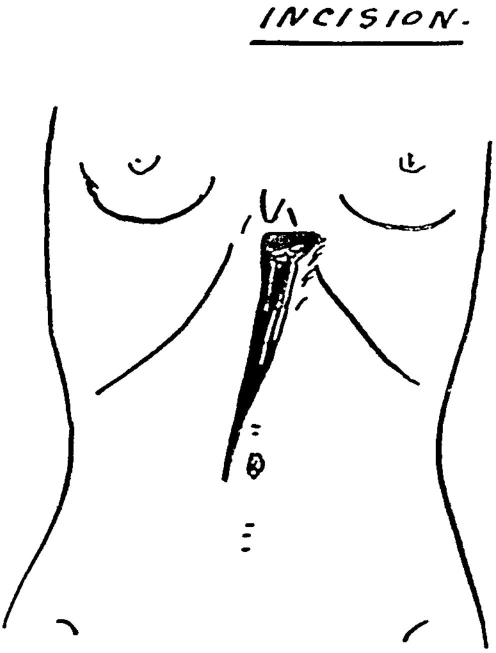


Fig. 5. Incision.

matic fold. The fundus is liberated up to the esophagus.

Buttonhole. The lesser sac and the hilum of the spleen as also the entry into the lower abdomen and Morrison's pouch, are packed off with gauze. The hard scar tissue is cut away from around the edge of the old gastrostomy opening until a more or less normal stomach wall abuts on it from all sides. If it is too far away from the lesser curvature or the pylorus, it is closed longitudinally in layers.

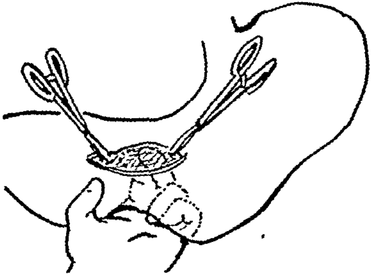


Fig. 6. Making the "buttonhole."

The buttonhole should be about two-thirds of the way from the greater to the lesser curvature and about 1 to 2 inches above the pylorus (Fig. 6). If the old gastrostomy opening partially fulfills this requirement, the other portion is closed and the rest enlarged by means of scissors to the size desired. The opening is then held up and the mucosa followed visually until the mucosa on the posterior wall of the stomach is reached. A fold of this is gripped by means of tissue forceps where the posterior opening in the posterior wall of the stomach will be. There should be a strip of about ¾ inch between the two openings inside the lesser curvature. Both ends of the proposed incision in the posterior wall are defined with tissue forceps and a finger is brought up behind the stomach, pushing the posterior wall through the opening. It is incised carefully on this finger, using a sharp scalpel. The small opening thus effected is enlarged by scissors (Fig. 6).

This part of the operation is emphasized and described in detail because, though seemingly simple, it is possible to commit a number of errors which it will take time to rectify. (1) The buttonhole may be placed too near the greater curvature. This causes a narrowing of the proposed tube at this point. (2) The mucosa of the lesser curvature may be cut right through and the tube made with musculature alone for some distance.

Once corresponding openings in anterior and posterior walls have been made, their corresponding edges are sewn together with chromic catgut on an intestinal needle including all layers. In this way a buttonhole is formed and the stomach given the shape of a lopsided doughnut. The buttonhole stitches are placed all around the opening except for about ½ inch on the oral side where the clamps will be placed. The ends of the sutures are left long.

Section of the Stomach. Two long split clamps, curved laterally, are inserted parallel to each other with one blade through the buttonhole, the other across the anterior surface of the stomach up to the fundus and just lateral to the cardia. A tacking stitch is then run down the slots from the fundus to the buttonhole (Fig. 7). The ends of the tacking stitches are left long and unknotted.

This is the most difficult part of the operation as there is no room under the diaphragm for the needleholder and control of the needle, while sewing toward oneself is precarious at best.

To avoid inclusion of retroperitoneal tissues in the stitch a long-bladed retractor is inserted behind the stomach. Even so, it is very difficult to find the slot again as the needle comes up. For this reason I have had a special instrument made to my design, which circumvents these difficulteis.

Now the stomach is divided between the clamps (Fig. 8). The clamps are removed and the ends of the tacking stitches are brought out into the wound. Bleeding points are caught.

Shaping the Lesser Curvature Tube. The greater curvature portion is packed away in warm saline gauze. Then, with a bent intestinal needle on chromic catgut, pursestring sutures are carefully run around the upper end of the incision in the lesser curvature. The end of the intestinal suture is then

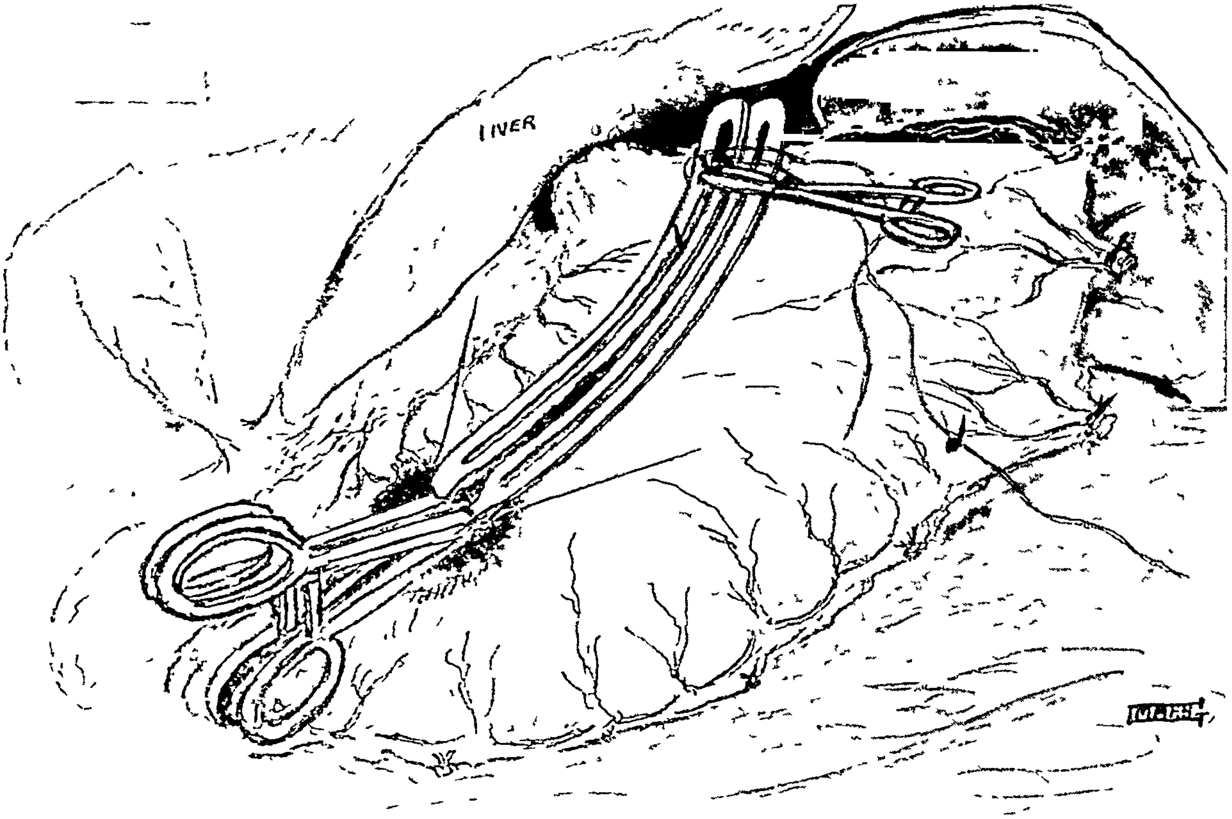


Fig. 7. Split clamps applied before section of the stomach.

knotted to the end of the tacking stitch and both ends held in a clamp for control (Again it must be emphasized that this portion of the stomach may be partially retroperitoneal and not covered with peritoneum). The suture then closes the lesser curvature with a fine cross stitch outside the tacking stitch When the buttonhole is reached it proceeds along it in a Lembert suture, after having been knotted to the other end of the tacking stitch As the buttonhole portion of the suture line eventually carries the greater part of the strain it must be especially reinforced A second intestinal suture line, this time in Lembert suture all the way, completes this part of the operation

Sewing the Greater Curvature Tube It is essential that this tube be sewn on the stretch This is the reason why the tacking stitch was preferred to the clamp and suture, since the latter would have formed an unyielding suture line

With the first of the two intestinal sutures [illegible] lesser curvature knotted to the suture which originally closed the buttonhole, the tube composed of the greater curvature is sutured all along its length with fine stitches and including all layers As one proceeds, the tacking stitch is loosed stitch by stitch. Meantime, two assistants hold under tension the part that is sewn, taking care not to transmit this tension to the root of the stomach and the solar plexus When the catgut runs out (usually after about 4 inches) new catgut is knotted to the end and the suturing process continues

As the fundus is reached a preliminary measurement is taken to determine whether the tube is long enough to meet requirements If it is not, the "return" tube in the fundus can be incised at right angles to the suture line and sutured

The tube of greater curvature, having been sutured its entire length, a return line of Lembert sutures is made, closing the serosa over the first suture, the assistants continuing to maintain tension At the pyloric end it is knotted to the second suture in the lesser

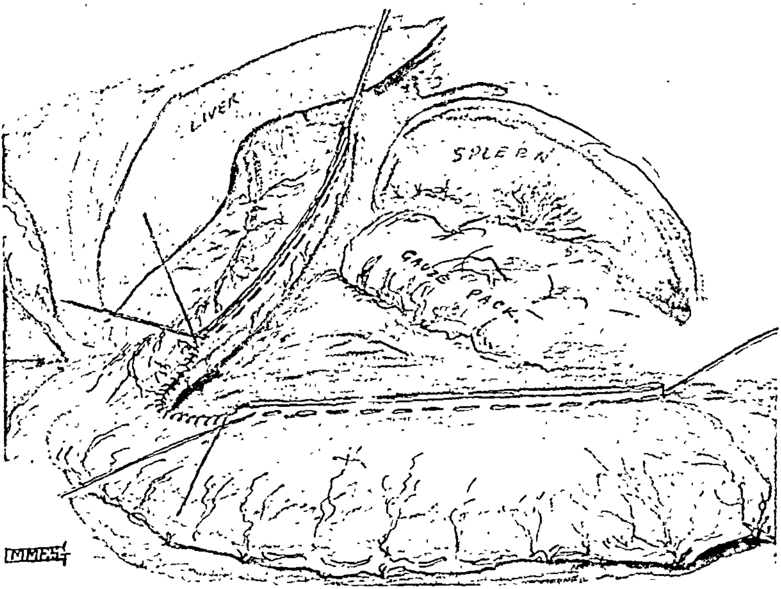


Fig. 8. Section of stomach between clamps.

curvature, continuing once more along the inside of the buttonhole until one reaches the beginning of the tube composed of lesser curvature where the final knot is made to the original buttonhole suture on that side. *For further safety the portions containing* the buttonhole and lesser curvature are enclosed in a fold of omentum fixed by a few tied sutures.

The Subcutaneous Tunnel. The tube is brought out of the abdomen and the point in the jugulum to which it will reach is defined. An incision parallel to the anterior border of the sternocleidomastoid muscle is made into the subcutaneous tissue. Though surgically this incision is not correct it is chosen because it gives adequate access to the upper esophagus at the second stage of the operation, necessitating the making of only one scar.

A long amputation knife is inserted into the transverse portion of the abdominal incision, superficial to the costal cartilages, and is pushed up subcutaneously toward the jugulum. Down this track a long strong *clamp is inserted and opened at intervals as* it passes along the way in order to form a canal of ample width by blunt dissection. The process is repeated from above until the two tunnels meet.

Placing the Stomach Tube. The stomach tube is painted with mercurochrome and dusted with sulfonamide powder to prevent as much as possible infection of the subcutaneous tissues of the chest and neck. A long clamp is then inserted through the tunnel from the neck down. It may be necessary to place an incision halfway. This is preferred to pulling the tube from above with a string, as the latter [illegible] no [illegible] [illegible]

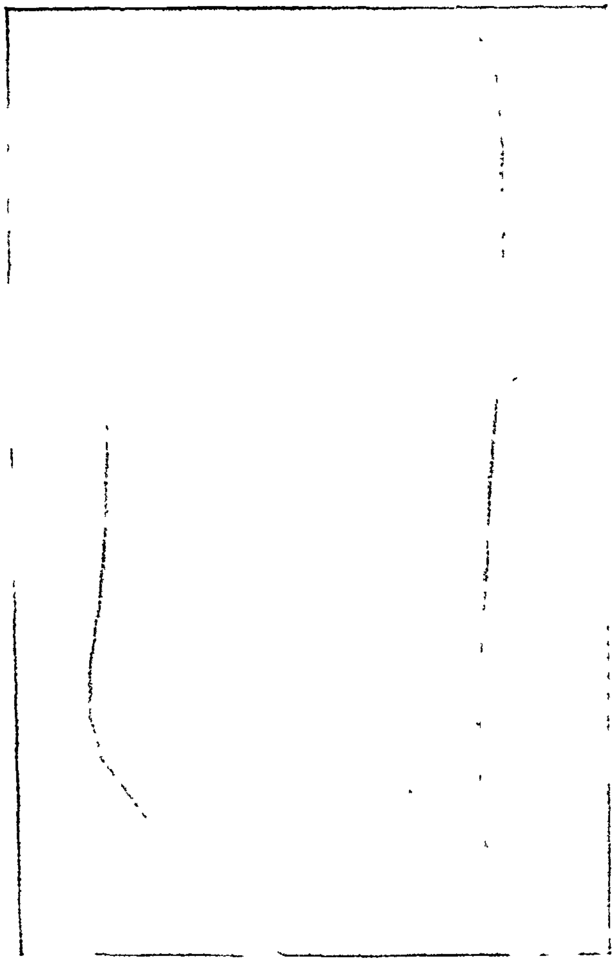


Fig 9. Final result one month after final operation.

a possible spiral twist in the subcutaneous tunnel and may interfere with the blood supply.

The tube is grasped by its tip and slowly pulled up while an assistant feeds it into the opening below. Thus by pushing and pulling it is carefully worked up into the tunnel until it lies in the required position. The tip is then sutured to the sternocleidomastoid by four or five stitches. This first stage ends with closure of the incision and the abdominal wound, but without suture of the upper end of the left rectus.

The second stage, undertaken when the patient has sufficiently recovered from the first, consists of anastomosis of esophagus to upper end of the tube and has been adequately described by previous authorities. The final result, one month after final operation, is shown in Figure 9.

DANGER POINTS IN THE OPERATION

1. The buttonhole bears the greatest strain. Therefore, the sutures around it must be made with extreme care. A rag of omentum twisted about it probably assists in preventing leakage.

2. Closure of the lesser curvature probably would be improved by sewing the edges of mucosa together with a fine stitch, removing the tacking stitch and closing the tube with two rows of Lembert invaginating stitches.

3. Bleeding from the short gastric artery may cause difficulty. It should be sought for before it is found accidentally. A cholecystectomy clamp is of great help in tying it off.

4. In part, the lesser curvature often is retroperitoneal with vessels entering the posterior surface from the retroperitoneal region.

5. If the esophagus is cut with care not to soil the surroundings, and if the distal stump is doubly carbolized and allowed to sink back into the mediastinum, the result is satisfactory. A small catheter sewn into the wound down to this stump through which chemotherapeutic agents can be introduced for the first few days, may aid in taking care of further infection. Hence there is no necessity to leave the esophageal pouch from which the patient regurgitates into the gastric tube after meals. A simple end-to-end anastomosis between esophagus and gastric tube, with the former well invaginated into the latter, is best.

Adequate preoperative and postoperative care are essential for best results.

SUMMARY

The method described is theoretically sound and in all patients in whom it was employed the tube was perfectly viable regardless of ultimate outcome. Not a single instance even of partial necrosis was encountered. Anatomically, the lesser curvature does not have enough stretchability to be used as a tube replacing the esophagus intra- or antethoracically. This can be overcome by using

the greater curvature with its greater stretchability for this purpose.

SOMMAIRE

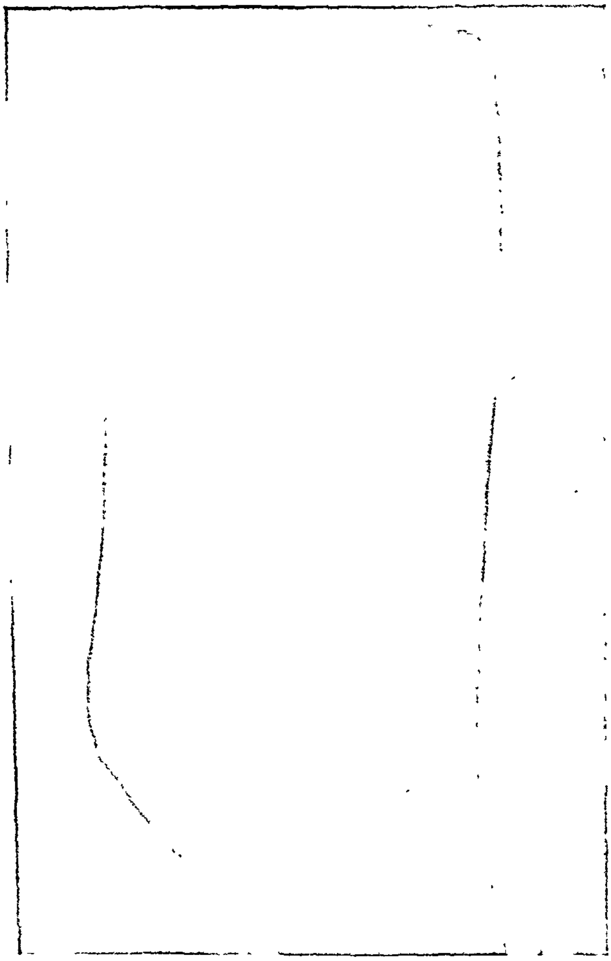
L'emploi de la grande courbure de l'estomac est en théorie sain. Dans tous les cas où ce procédé fut employé, le tube ainsi constitué fut viable; pas un seul cas de nécrose partielle fut constaté. Anatomiquement, la petite courbure de l'estomac ne possède pas assez d'extensibilité permettant, son emploi comme tube remplaçant l'oesophage intra ou anté-thoracique. On surmonte cette difficulté en faisant usage de la grande courbure de l'estomac vu l'extensibilité de celle-ci.

SUMARIO

El uso de la curvadura mayor del estomago es teoreticamente de valor y esto ha sido comprobado practicamente en aqueyos paciente en que su empleo probo que el tubo ha si formado mantuvo su viabilidad. No encontramos ni siquiera un caso de necrosis parcial del tubo en los casos en que este fue empleado. Anatomicamente la curvadura menor del estomago no posee el suficiente poder de estrecharse para su utilizacion en la formacion de un tubo para reemplazar al esofago intra o ante-toracicamente. En cambio la curvadura mayor posee gran poder re estrechabilidad.

RIASSUNTO

L'adozione della grande curvatura dello stomaco per la formazione di un canale e' teoricamente esatta. In tutti i casi nei quali e' stata prescelta, ha consentito la formazione di un canale che rimane pervio, indipendentemente dall'esito dell'operazione. In nessun caso si e' verificata una necrosi, sia pure parziale. La piccola curvatura dello stomaco non consente invece una distensibilita' tale, da permettere la sua sostituzione al'lesofago intra- o antero-toracico.



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Adequate preoperative and postoperative care are essential for best results.

SUMMARY

The method described is theoretically sound and in all patients in whom it was employed the tube was perfectly viable regardless of ultimate outcome. Not a single instance even of partial necrosis was encountered. Anatomically, the lesser curvature does not have enough stretchability to be used as a tube replacing the esophagus intra- or antethoracically. This [illegible] be overcome by using ful in visceral shock of the rat, though it is beneficial in peripheral shock. Applications of heat to keep body temperature normal or even slightly above normal gave better results than cold. This is all the more surprising because local tissue vitality, judged by color, texture and other indications, is much better preserved at low than at high temperatures, just as it is in the limbs. This intestinal shock mortality was therefore contrary to the usual rule that severity of shock is related to severity of tissue damage. It seemed possible that shock might be aggravated by depressed function of the liver or other organs, or by the inflammatory reaction following chilling of the intestine. Therefore I published a doubtful suggestion[4] that hypothermia is perhaps not a suitable treatment for visceral shock.

It was necessary, however, to think of other thermal peculiarities of the rat. It is known that the limbs and other peripheral tissues of man and the large mammals can be frozen solid for limited periods without necrosis, also, according to Ebin[5] their visceral tissues, including blood vessels, liver and brain tissue, can be frozen at the temperature of solid carbon dioxide for one minute without discoverable microscopic damage ensuing. It is shown elsewhere[3] that no such results are possible in the rat, and even the prevention of coagulation by heparin does not prevent the necrosis which follows very brief freezing. Baxter[6] has proved that scalded rats' tails are injured by hypothermic treatment, and I have confirmed this result. Nevertheless, local hypothermia for burns of human patients, in our experience, is spectacularly beneficial, and the failure of surgeons to try it is regrettable.

When it became possible to secure cats and dogs for the shock experiments, the findings became logical. The ligated intestine was much better preserved in color and vitality at low than at high temperatures, and the shock was correspondingly reduced. Stoppage of intestinal circulation for four or five hours at normal temperature is fatal. The tissue changes and severity of shock are increased in a saline bath above normal temperature, while a temperature of 5° to 15° C. in the saline bath allows the animal to survive with only slight depression. These results in the larger mammals can confidently be applied to clinical conditions. If any part of an intestine or other viscus lacks circulation, the surgeon should surround it with cold rather than hot towels. Shock resulting from trauma of viscera, or from trauma or intoxication affecting the entire body, can be appropriately treated by hypothermia. The mild systemic hypothermia cannot equal the results of radical local refrigeration, but there is no physiologic or therapeutic distinction between peripheral and visceral origin of shock, and the contradictory results in rats are merely a peculiarity of that species.

The second topic deals with the new uses of procaine, which until recently ranked only as a local anesthetic, but which displays such remarkable systemic effects that a considerable literature has already accumulated on the intravenous administration. I have had no facilities for making anything more than crude clinical observations and animal experiments on a clinical pattern. Some of the findings may be suggestive for persons who are in position to utilize the necessary exact physiologic and pharmacologic methods.

It is accepted pharmacologic doctrine that procaine anesthetizes first the sensory nerves, because of their smaller caliber or different permeability, and affects motor or other neurones later and to a less degree. The systemic administration of such doses as have heretofore been considered physiologic has been found to produce a perceptible but slight reduction of pain sensitivity. A logical deduction led to my first interest in this subject. In shock studies, the increased vascular permeability in injured regions is a prominent feature; hence it seemed possible that procaine circulating in the blood might diffuse selectively into such injured areas and relieve the associated pain. This theory seems to be substantiated by the relief in cases of burns and of postoperative pains, as reported by Gordon[7] and McLachlin[8] in Canada, the selective permeability being such that dressings of a burned patient can be changed painlessly although there is no noticeable sensory alteration in normal skin areas.

These infusions of procaine in low concentration, usually 0.1 per cent, are now extensively used for the widest variety of painful conditions, with results varying from dramatic success to practically total failure. The benefit of addition of small amounts of a barbiturate has been stressed particularly by Fraser,[9] and glucose and vitamins may aid further (Richards[10]). In general, clinical observations seem to agree with the hypothesis that relief of pain by low-concentration procaine infusions is in proportion to the permeability in the painful region.

I know of no experimental proof of a selective effect of systemically administered procaine upon the sensory nerves of animals. My observations of clinical type in animals indicate no duplication of the results seen in patients. Not only the pain sense in normal regions but also the sensitiveness of wounded areas seem to persist, unless the procaine dosage is high enough to disturb the general consciousness. The empirical conclusion at present is that procaine in low concentration intravenously is an ideal, harmless and non-habit-forming analgesic for many kinds of pain in human patients, but not in animals. I have had no monkeys, and these statements apply to rats, rabbits, cats, and dogs.

One feature of our work at City Hospital was the introduction of procaine in higher concentrations and larger amounts. The concentration has often been 1 per cent, and the highest dosage in 24 hours has been 20 Gm. Such quantities, which were formerly regarded as prohibitively toxic, are harmless if given slowly enough to avoid disturbances of consciousness. The safety factor is the destruction of procaine within a few minutes after it enters the blood. Thus there is no cumulative effect; the doses may be repeated on as many days as desired, and Jacoby and associates[11] have proved that liver function is not impaired. The more concentrated and more prolonged infusions may relieve some pains which are refractory to smaller infusions.

We also increased the rapidity of the strong infusions to the point of abolishing consciousness. Neurologists may perhaps be interested to explain why speech is the first faculty lost, at a point when the patient can still respond by signs. We had considerable satisfactory experience with this new method of general anesthesia, first for obstetrics and then for miscellaneous surgery.[12] The ideal features are the flexibility, absence of depression, absence of fluid loss by sweating, quick recovery of consciousness, and absence of nausea or other unpleasant sequels. Overdosage brings on a convulsion, which is not dangerous but can be avoided by heeding the plain warning signs, and the tendency is largely obviated by addition of a barbiturate. The safety of the method seemed to be particularly assured by the rule, which seemed uniform in animals and patients, that intoxication is always heralded by a harmless convulsion. It remains true that a mild convulsion is harmless, even if carelessness allows it to occur. But this method of anesthesia has had to be abandoned because of a rare crisis of another kind, namely, a sudden cyanosis and collapse without convulsive or other warning, which may even be acutely fatal. No advance notice is furnished by dermal or other sensitivity tests; also, such an attack may occur in a patient who has previously borne this anesthesia excellently and who also takes it uneventfully afterward. It appears that procaine can be a very valuable agent for general anesthesia if a safeguard can be discovered against this kind of accident.

Naturally, the new interest in procaine is leading to many attempts to settle various problems by animal experiments. But in addition to the previously mentioned differences in action of small doses, there are still greater differences in high dosage in man and animals. First, the above-mentioned collapse without warning has not yet been observed in an animal; the convulsive effect of toxic doses seems to be invariable. Second and more important, procaine does not serve for general anesthesia in animals. Convulsions predominate over unconsciousness; and even in the collapse following a severe convulsion a painful stimulus, such as pinching the tail, elicits a jerk which equals or even exceeds the reaction in the normal animal. Dogs and cats become intensely nauseated and salivated, in contrast to the comfort of human patients.

Because of the great differences between species, at least in effects on the nervous system, much caution is necessary in drawing clinical deductions from animal experiments.

Furthermore, procaine is suggesting new points of view concerning some clinical conditions which cannot be studied in animals. When surgeons use local procaine infiltration for conditions such as a sprain or bursitis, the benefit supposedly is explained by release of muscle spasm and improved local circulation. Intravenous procaine infusions may relieve such pains temporarily or permanently, but the explanation becomes more difficult when arthritis is thus benefitted. Graubard and associates[13] have reported the largest series of such cases, with relief of pain and improvement of function continuing for months, especially in chronic hypertrophic arthritis, but with little or no success in the rheumatoid form. We have had our most striking results in either acute attacks or exacerbations of chronic nonbacterial arthritis. An example is a middle-aged laborer who entered City Hospital with the large joints of both legs typically swollen, hot and painful, the type of case that would ordinarily require strong sedatives for the severe pain and a longer course of salicylates and physical therapy. Having been admitted late in the afternoon, he received an intravenous infusion of 1 per cent procaine for 1 hour. Pain was nearly abolished in one leg and reduced in the other, but after a few hours the full intensity of pain returned and required sedation during the night. At 9:30 the next morning another infusion of 1 per cent procaine was started. Pain disappeared completely in about 2 hours. The infusion was continued until 1:30 p.m., when the patient complained of slight weakness. Pain and tenderness remained absent; the joint swelling promptly subsided, and the patient immediately left his bed and walked comfortably until discharged. We do not know how to predict which cases of arthritis, neuritis, etc., will respond and which will get little or no relief. But these instances of either immediate cure or remissions lasting for months in chronic cases are theoretically challenging. Pathologists who theorize about the nature of arthritis must take account of this possibility of abrupt termination, whether interpreted on an allergic basis or otherwise, and there may also perhaps be new questions concerning the pharmacology of procaine[14] or its split products.

The two halves of this discussion lead to two conclusions, both pertaining to limitations of animal experiments. First, recognition of the thermal peculiarities of the rat species removes apparent objections to the hypothermic treatment of burns and of visceral as well as peripheral shock. Second, the remarkable clinical effects of intravenously administered procaine suggest new problems in pathology and physiology, but the experiments which are undertaken to solve them must be interpreted with consideration of the different actions of this drug in man and laboratory animals.

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Cutis: Its Various Uses in Surgery

JOHN E. CANNADAY, M.D., F.A.C.S., F.I.C.S.
CHARLESTON, WEST VIRGINIA

FOR many years past,[1] surgeons have been greatly concerned about the desirability of a suitable type of tissue for the making of repairs and especially for the replacement or filling in of defects, more especially those occurring in the abdominal and chest walls.

To secure such repair tissue the surgeon often has borrowed from the various aponeuroses, and from fascia lata. The defects caused by the removal of such tissue have at times caused trouble, such as muscle hernia. Furthermore, at times the results of the attempted repair have not been all that could be desired from the standpoint either of immediate or long range result.

In cutis the surgeon has an ideal material which lends itself readily for the purposes of suture, reenforcement or replacement wherever and whenever strong and dependable material is needed for purposes of suture or repair. This repair material may be used to replace peritoneum, pleura or aponeurotic tissue.

Cutis possesses many advantages. For instance, it is easily obtainable from the tissues of the patient who needs it. It vascularizes quickly and heals into its new position in a short time. Its use is seldom followed by infection and it is gradually converted into fibrous tissue.

Some Indications for the Use of Cutis. The greatest field of use for cutis undoubtedly lies in the repair and reenforcement incidental to the cure of large hernias,[2] more especially those of the incisional type. Following that, I would say that it is especially useful for the suspension of organs such as the uterus, more particularly the cervical portion of that organ after subtotal hysterectomy. Again, it [illegible] will take the place of catgut tape for the [illegible] purposes incidental to the suspension [illegible] prolapsed or floating kidney. [illegible] sling of sorts could be made of [illegible] the kidney which could be [illegible] rib or elsewhere so as [illegible] fixation of the kidney. Also, it may be used satisfactorily in the Henderson type of operation for chronic, recurrent dislocation of the shoulder. It is useful as replacement material for dural defects. We have repeatedly made use of the cutis strip for the purpose of ligating large veins and arteries[3, 4, 5] such as the vena cava and the carotid artery, without a failure to date; also, the femoral artery in a case of aneurysm involving that vessel. Cutis has been used with great success by Rehn[1] and others for lining material incidental to the reconstruction of joints; to bind together oblique fractures of the long bones of the arms or legs, more especially the femur and the humerus; to repair fractures of the patella; for reconstruction of the crucial as well as the external ligaments of the knee[6]; to build up underneath the skin and thereby eliminate depressions of surface contour: two superimposed layers may be slipped into position for this purpose. Cutis can be of value in dealing with certain cases of cancer of the breast that have advanced to so great an extent that it may become necessary to resect a portion of the chest wall and pleura.[7] The resected pleura can be readily replaced with cutis.

Technic. In regard to hernias, we make the best possible repair we can and then reenforce strongly with cutis, anchoring it on firm stretch with interrupted sutures of stainless steel wire, usually 32 gauge, or heavier.

When ligating blood vessels we generally have made use of a strip of cutis which has been cut 5/8 of an inch in width (on stretch this narrows down quite a lot). The strip is carried twice around the blood vessel and drawn sufficiently tight, after which the ends of the cutis strip are held securely at the desired degree of tautness and firmly held together with a hemostat. Several U sutures are passed through the parallel ends and securely tied. Ligation of the free ends of the cutis strip into a knot is not satisfactory as the knot will slip and the vessel will not be held firmly by the slippery tissue. In ligating large veins like the vena cava it is necessary to handle the vein with care and gentleness as it can be easily torn.

In regard to the anchoring and fixation of either the prolapsed or potentially prolapsed uterus, the strip of cutis must be of adequate length, cut approximately one inch wide so as to allow for narrowing by stretching. No more than a very thin film of epidermis should be removed before cutting. This strip should be carried around the upper portion of the cervical neck between the peritoneal coat and

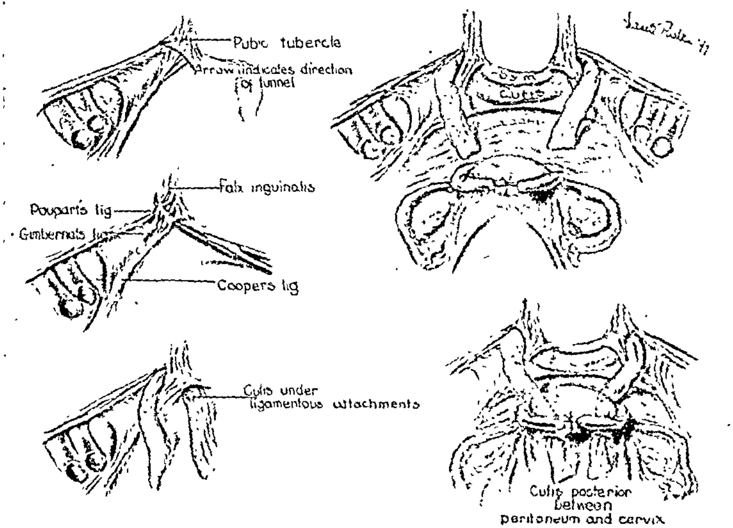

Pubic tubercle
Arrow indicates direction of tunnel
Falx inguinalis
Poupart's lig
Gimbernat's lig
Coopers lig
Cutis under ligamentous attachments
Sym
Cutis
Cutis posterior between peritoneum and cervix

Fig. 1. Details of technic using cutis in suspension of the uterus.

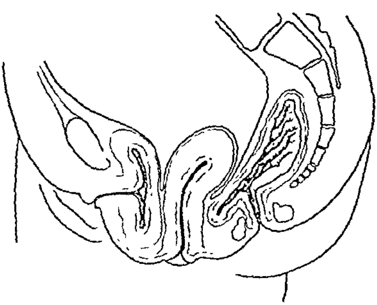


Fig. 2. Prolapse of uterus before operation.

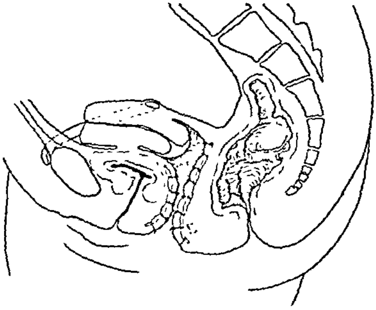


Fig. 3. After cutis graft suspension of uterus.

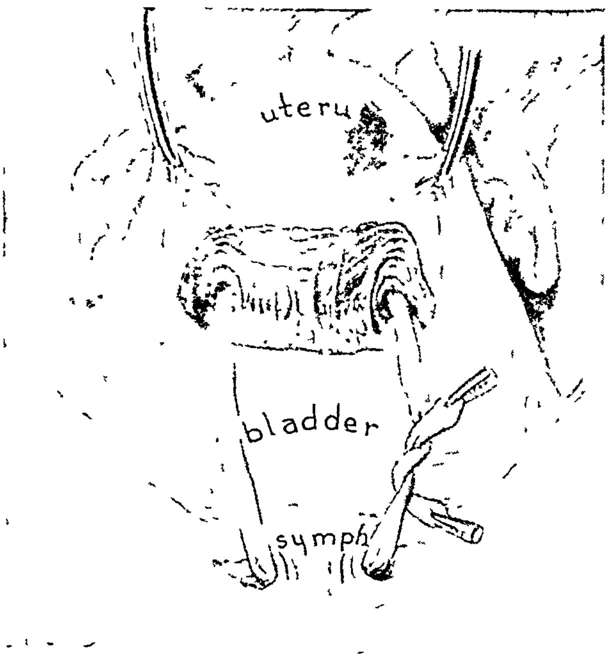


Fig. 4. First stage in cutis graft suspension of uterus.

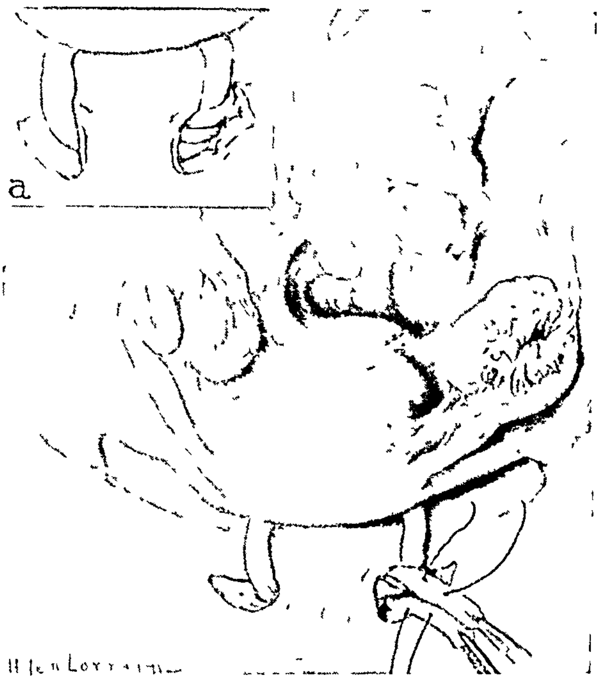


Fig. 5. Final stage, cutis graft suspension of uterus.

the cervical tissues (the cutis strip should not enter the cervical canal). At this point a tunnel is made between the pubic bone and the overlying fibrous tissues in the region of the tuberculum pubis. The tunnel can be readily made with a sharp-pointed heavy, curved hemostat. Through this opening the free ends of the cutis strip are held under firm tension while they are anchored to each other with sutures of heavy stainless steel wire, usually 28 or 30 gauge. The exposed portions of the cutis strip are carefully covered with available protective material such as bladder peritoneum or rectal appendices epiploicae, or both.

Cutting of the Grafts. In this phase of the operative technic the surgeon has considerable leeway. For the narrow strip graft suitable for suspensions, ligation and suturing, a satisfactory strip of cutis may be denuded of its superficial epithelial layer by so simple a device as a sextoblade for a safety razor held either by a special holder or even by a hemostat, or by the dual safety bladeholder being put out by one of our leading surgical instrument houses, the skin surface being held taut with the traditional soap boxes, strips of wood or the Ferris-Smith skin tractors.

When it is necessary to have a wider piece of cutis, the surgeon has a considerable choice of instruments or gadgets, for instance, the Blair-Brown knife, with or without the Marcks attachment, the Ferris-Smith knife, the Caltagirone knife and apparatus, or the Padgett machine. According to Blair and Brown the Padgett apparatus may possess some advantages in cases of infants and small children. The skin edges of the incision usually are closed with vertical mattress sutures; a pressure dressing is applied and usually left in place for about 10 days.

Relative to the implantation of whole thickness skin [8, 9] as a substitute for the cutis graft by a few surgeons, this type of skin graft implantation was used by Bames[10] of Los Angeles many years ago in his plastic work. Acting on his suggestion, I made such an implant about nine years ago and found to my surprise that the skin surface began to fuse with the overlying tissue inside of a week. I wrote Doctor Bames about the result. He said that if I had placed a few drains between the epidermal side of the graft and the overlying tissues it might not have become adherent.

Case 1. Mrs. A. T., white, female, age 60, complained of pain in the left leg due to thrombophlebitis of numerous veins of the left leg and thigh which had occurred following a week in bed with influenza. Caval ligation was decided on for control of this condition.

Operation was performed by me April 7, 1947. A lower abdominal transverse incision was made and the vena cava exposed retroperitoneally. A short length of this vessel was mobilized by finger dissection. The vena cava then was ligated with a strip of cutis passed twice around it and anchored with double No. 30 cotton thread sutures. At the time of the patient's discharge from the hospital her symptoms were relieved and she stated that she felt quite well.

Case 2. Mr. G. H., white, male, age 64, was admitted to the second medical service of the Charleston General Hospital April 25, 1947, with thrombophlebitis of the right leg and pulmonary infarction of the right side of the chest. In spite of prophylactic treatment with dicumarol the patient's temperature continued to run septically and caval ligation was decided on.

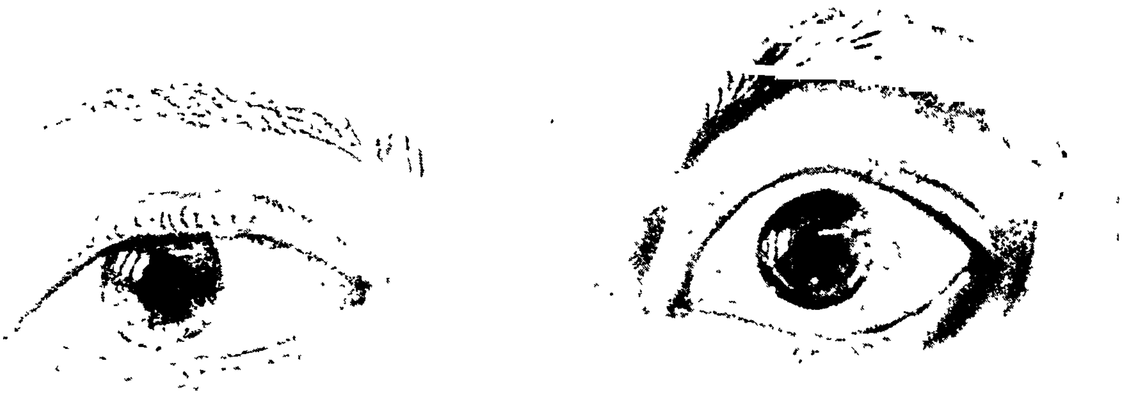
Operation was performed by me April 29, 1947. An incision was made at the level of the umbilicus. The vena cava was exposed retroperitoneally by blunt dissection and isolated at the level of the bifurcation of the aorta. A strip of cutis was carried twice around the vena cava, drawn snugly, and anchored with interrupted cotton thread sutures. The results obtained in this case were quite satisfactory and the patient left the hospital apparently completely well.

To date (Sept. 1, 1947), my colleagues and I have used cutis in 158 surgical cases, as follows: epigastric hernia, 7 cases; abdominal, incisional hernia, 33 cases (2 of these were secondary operations for recurrence); umbilical hernia, 4 cases; excision and reenforcement of chronically infected umbilicus, 1 case; direct and indirect inguinal hernia, 28 cases; diastasis of the buccinator muscle (glass blower's hernia), 1 case; marked bulging of the lower abdominal aponeurosis, 2 cases; herniation of the gastrocnemius muscle,[11] 1 case; prolapse of the uterus in which the cervix was suspended by a strip of cutis (2 of these were secondary operations for recurrence), 42 cases; urinary incontinence in which the urethra was suspended (modified Goebell-Stoeckel-Aldredge type of operation), 1 case; wobbling knee, 9 cases; ruptured crucial ligaments of the knee, 2 cases; fracture of the patella, 3 cases; clawhand, in which the third and fourth metacarpal bones were approximated, 1 case; fracture of the ulna, 1 case; ankylosis of the jaw, 1 case; sternoclavicular dislocation, 4 cases; luxation of the acromial end of the clavicle, 1 case; contour defect over a depressed area in the frontal bone, 1 case; chronic discharging sinus of the foot in which cutis was implanted after sequestrectomy, 1 case; cutis has been used in 2 cases for stage ligation of the common carotid artery; in 1 case for immediate ligation of the common carotid artery; in 1 case for partial occlusion of the femoral artery for the control of popliteal aneurysm; in 2 cases for ligation of the vena cava for the control of pulmonary embolism; in 3 cases for the replacement of torn dura; as a bridge for support of the bowel in 4 sigmoid colostomy operations; in 1 case for the relief of loss of bowel control (Harvey Stone type of operation (Doctor Abbott of New Orleans has informed me of his use of cutis in a similar case with a good result)).

SYNOPSIS OF RESULTS

In my personal series of 103 cases results remain about the same as at the time of my last report, with 4 minor wound infections, the development of a small area of cellulitis near the operative incision in 3 cases, and moderate serous drainage in 3 cases. In the last named, the sites of drainage were protected with shields of screen wire, 2 of the wounds healing promptly thereafter, the wound in the third case continuing to drain serum for several weeks, but not suppurating. In one other case a hematoma which developed healed promptly after removal of the clot. In the 103 cases there has been 1 death, evidently due to the anesthetic (no autopsy). No graft was lost in any case.

Of the remaining 55 patients in the series of 158 who were operated on by others, there have been 2 deaths, 1 occurring in an obese woman, a poor surgical risk to begin with, who was brought to the hospital at night as an emergency case, suffering from a large, strangulated, umbilical hernia. Since the strangulated bowel was found to be viable after release, a cutis graft repair was decided on and the patient died at the end of the lengthy operation, apparently as a result of shock and exhaustion. In this particular case



Muriel McLatchie /47

Fig. 6. Exophthalmos resulting from arteriovenous aneurysm.

a two-stage operation probably was indicated. No autopsy was obtainable. The second death was due to pneumonia following an operation for cutis graft suspension of the cervix; autopsy in this case disclosed an acute miliary flare-up resulting from an old healed tuberculosis of which no history had been given. Among these 55 cases there have been 2 severe wound infections (both of which occurred in hernia cases) in one of which one of the double thickness grafts used was lost. The hernia has not recurred in either case and, with 2 exceptions, in none of the cases in which cutis graft repair was made.

Results in the 9 cases of wobbling knee repaired by the cutis graft method have been fair to good, generally speaking. One of these occurred on the orthopedic service of Dr. Howard Swart, 3 were done by Dr. Randolph Anderson, and 3 by Dr. George Miyakawa. Through the courtesy of Doctor Anderson 3 of these patients have been heard from rather recently. In one case the result has been excellent; in a second, the result has been good. The third case required a second operation, and this patient now has about 75 per cent function. Results in each of the 2 cases of reconstruction of the crucial ligaments of the knee have been satisfactory. Doctor Miyakawa reports that his results from the use of cutis in knee joint repairs have been fair to good, that the results following

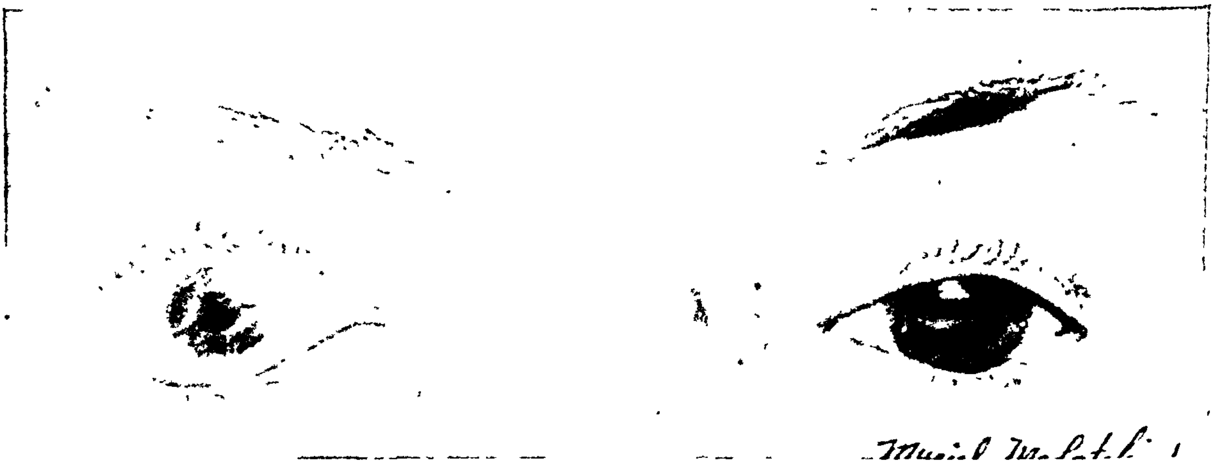


Fig. 7. After cutis graft ligation of common carotid artery.

repair of three sternoclavicular dislocations have been excellent. Doctor Swart has not heard from the knee case in which cutis had been used but says the results in the acromioclavicular luxations have been excellent. Neither has Doctor Swart heard from a soldier who had a chronic recurrent dislocation of the shoulder and who had a repair of the Henderson type in which cutis was used instead of tendon. The result in the single case of total ankylosis of the jaw has been excellent. When last heard from (Sept. 1, 1945), through the medium of her mother, the patient had had no difficulty in making a wide bite or in masticating her food since her operation in July 1943.

CONCLUSIONS

The operative mortality of 1.96 per cent in our cutis graft cases, as previously reported, remains the same; likewise, the recurrence rate of hernia has varied but little. Cutis is most valuable perhaps in the reenforcement and repair of incisional hernia. Its value for the suspension of the cervix in uterine prolapse probably would come next. It has been found to be ideal material for the replacement of dura, for the ligation of the vena cava, and for the common carotid and other large arteries. For ruptured ligaments of the knee and for the reconstruction of joints its advantages are believed to have been definitely proved. For stage or permanent ligation of the aorta it is believed to be of value.

SUMARIO

La mortalidad operatoria de 1.96% en nuestro casos de engrafte del cutis ha sido lo mismo que en los casos que hemos reportado en articulos previos. Lo mismo se puede decir del porcentaje de recurrencias de nuestras hernias. El cutis o dermis es el agente mas valuable en el reparamiento de la hernias incisionales. Su valor en el tratamiento del prolapso uterino probablemente sera reconocido con el tiempo. Se le ha encontrado el ser un material ideal en el tratamiento de los defectos de la dura madre, en la ligacion de la vena cava, la arteria carotida comun y otras arterias de calibre largo. En cambio su uso en la ruptura de los ligamentos de la rodilla o en reconstruccion de otras coyonturas tiene desventajas definitivas que han sido comprobadas. En la ligacion de la arteria aorta se cree ser de valor.

RIASSUNTO

La mortalita' operatoria dell' 1.96% nei casi di trapianto della pelle e' rimasto quale era stata riportata in articoli precedenti. Anche la percentuale di recidive nei casi di ernia e' rimasta presso a poco immutata. La pelle rappresenta il materiale piu' adatto per riparare e rinforzare le ernie postoperatorie: per la sospensione del collo dell'utero nei casi di prolasso uterino. E' un materiale ideale per la sostituzione della dura; per la legatura della vena cava, della carotide comune e per altre arterie di grosso calibro. L'A. ritiene che la pelle non sia invece adatta per la ricostruzione delle articolazioni e per riparare i legamenti del ginocchio. Puo' trovare un' indicazione nella legatura a tappe o nella legatura permanente dell'aorta.

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Tantalum Wire in Surgery*

KARL SCHLAEPFER, M.D., F.I.C.S.
MILWAUKEE, WISCONSIN

THE search for the best suture material is still on. Among the nonabsorbable materials, silk and cotton have had the preference, particularly in layers of tissue where the strength of the approximated borders (fascia, muscle) is put to a stretch immediately after operation. The sutures have to stand the intermittent pull on every motion of the body. For weeks after operation fibrous tissue formation across the united incision has not progressed sufficiently to avoid separation. Howes[7] and Harvey[5] have shown that union is minimal for the first four days following laparotomy. Fibrous tissue increases up to the twelfth day. For the first five days the sutures hold the wound together. Separation due to too early absorption of catgut is probable. A zone of reactive and degenerated cells around the catgut is noted. When using silk or cotton this is less marked. The least reaction is encountered around tantalum wire. It is practically absent. Jenkins reports the formation of white fibrous tissue in scars where wire had been used for closure. The wound edges showed a firm union, resisting separation by pull with retractors. Two weeks after operation a scalpel was necessary to divide the layers. Preston reports that an upper abdominal incision closed with strong catgut could be pulled apart easily 14 days after operation, exposing grey friable poorly vascularized wound edges. This prompted him to advocate the use of nonabsorbable suture material. When using absorbable suture material, slow separation of the united borders will cause weakening of the final scar and subsequent herniation. On the surface of the body it will result in a widened scar with possibly some keloid formation instead of a fine linear scar. In using absorbable material like catgut in the same layers, the danger of separation is much greater since even chromic catgut, at times, gives way within a few days in tissue under tension. It is probably due to a variance in the formation of certain chemicals in the tissue fluid of a given person which dissolves the catgut more quickly. Even chromic catgut can become weak early and break. When using nonabsorbable suture material like silk or cotton, this danger is eliminated. Another factor enters the picture then which makes these two materials undesirable. The danger of infection within or around this foreign body with formation of a fistulous tract leads to a persistent purulent discharge until the suture material, acting as a foreign body, is eliminated by nature. If suppuration persists, curetting or a secondary major surgical procedure becomes necessary.

Kocher and Halsted realized the shortcoming of catgut. Tetanus as a source of infection is now well under control although the chemicals used in the processing of catgut are not beneficial for its tensile strength. Early disruption by digestion even of chromic catgut is still a factor. Proteins liberated from decaying catgut sometimes give rise to allergic reactions (Kraissl and Babcock). Kocher and Halsted therefore, used silk only in clean surgical wounds. They stressed the fact that the exudative tissue reaction is much less marked around silk stitches than when catgut is used. This has been confirmed by Harvey and Howes.

All the facts mentioned above prompted the search for another materal nonabsorbable in nature and inert in the tissue. Tantalum seemed very promising. The use of metal as suture material is not new. Silver, aluminum, brass and various steel alloys have been used in surgery at one time or another. According to Babcock,[1] J. P. Mettauer in Virginia was the first to use lead wire to close vesicovaginal fistulas (32 cases). J. Marion Sims used silver wire for the same operation, with success. The wound healed by primary intention. In 1932 Babcock introduced alloy steel wire for sutures. Using the same thickness the tensile strength was much greater for wire than that of any other material. The knot stayed firmly tied even when the wire was cut close to the knot. When buried in the tissue, Babcock found no polymorphonuclear exudate or any noticeable tissue reaction in contrast to silk or catgut. At reoperation the wire looked like new without evidence of oxidation. It was embedded in dense fibroblastic tissue. Even when used in infected areas no abscess results around wire sutures. Granulation tissue is formed around them and subsequently replaced by dense fibrous tissue without sinus formation.

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A further advance in the use of metal sutures was the introduction of tantalum in 1940 by Burke[2] of Vancouver and Carney and Burch[3] of Vanderbilt University. Tantalum is an element discovered in 1802 by Ekeberg in Sweden after prolonged, tedious efforts. This prompted him to call this new element after Tantalus, the ill-fated son of the mythological Greek god, Zeus. It is a metal having the chemical property of glass and the physical character of steel. It is inert to all inorganic acids except hydrofluoric, fuming sulfuric acid, and many of the organic acids in high concentration. It is biologically inert to animal and human tissue.

Until 1922 only small amounts of tantalum were produced in Germany. In 1922 a new method of production was evolved. At one time the only mine producing tantalum was located in Western Australia. More recently sources became available in this country and abroad.

Tantalum-containing ore cannot be refined by smelting. A special method of processing is necessary to obtain pure tantalum powder. Tantalum is bluish gray. In rolled polished sheets it has a metallic appearance similar to platinum. The metal powder is pressed into bars and sintered in a vacuum at a temperature approaching the melting point (2996 degrees C.).

In experimental studies with tantalum over a period of 18 months Burke found tantalum to be inert with double the strength of steel, very malleable, and noncorrosive. It did not liberate toxic substances when in contact with tissue. Kiskadden[9] reports that substitution of tantalum for silk resulted in reduction of induration, redness, and infection. White and Hamlin[15] noticed that silk sutures produced tissue irritation even under the most favorable circumstances, the strands being gradually pushed apart by dense masses of fibroblasts. Tantalum wire (0.003 inch in diameter) was found by them to be less irritating, easier to tie than other available metallic suture material and without any tendency to slip on the first half hitch of a square knot.

I have been using tantalum wire (0.007 inch in diameter) as interrupted stitches with great satisfaction in all layers of tissue which need good approximation to guarantee a resistant scar. Bearing Langer's line of minimal tension in mind, I use interrupted tantalum wire stitches in approximating muscle to muscle and fascia to fascia in all incisions. When using wire (0.007 inch in diameter) in muscle great care has to be taken to avoid any crushing by leaving the wire loop wide enough to prevent interference with the circulation from the secondary edema occurring one to two days after suturing. When suturing separated fascia layers a small bite is taken with loose but accurate approximation. Until recently I have been using chromic catgut for closing the peritoneum. Now I have started to use wire for all layers when closing abdominal incisions. This has been made possible by the introduction of braided tantalum wire. This braided wire corresponds to catgut 000 in thickness, but has the tensile strength of the standard monofilament wire (0.005 inch in diameter). It is much more pliable than the standard monofilament wire and resembles silk in its handling. In the tissue it has the same characteristics as the original tantalum wire. It can be used as a continuous stitch for closing the peritoneum. The only disadvantage observed is in the tying. Occasionally the first knot slips if not fixed with an instrument (needle-holder) while the second knot is applied. According to Preston standard tantalum wire, when examined under the microscope after stretching, shows numerous fine transverse ridges which act as teeth, thus increasing the friction and preventing disruption of the knot. When using braided wire this lengthening of the wire when being stretched is apparently not as marked. This explains the occasional loosening of the first knot when braided wire is being used. The lack of elongation in braided wire is due to the use of wire .002 inch in diameter in the braiding. If the square knot is tied without rolling, the first throw will not slip. If when making the second throw, one draws the wire down snugly, one can cut to the knot without any difficulty and without fear of slippage.

Tantalum wire can be used with great advantage as a subcuticular stitch. Its inertness in the tissue allows one to leave it in place longer before removing it. In doing so it guarantees a resistant scar.

The use of fine tantalum wire (0.005 inch in diameter) in subcutaneous tissue in the form of interrupted small bite stitches proved particularly advantageous in thyroidectomies using Kocher's transverse incision. In doing so the interrupted wire skin stitches can be removed after 24 to 48 hours. A subcuticular wire stitch might prove advantageous following radical mastectomy. Subcutaneous tantalum wire stitches are preferable to silk which I have used routinely for years. The wire has never given rise to stitch abscesses. The wire stitches guarantee approximation of the skin without border necrosis. On very thin persons, however, the knots later have sometimes protruded over the skin edges of the scar. When this happened, removal of stitches was an easy matter. Even after months no infiltration or suppuration was present as encountered when using silk.

Hayes and Burr,[16] using wire for sutures in abdominal wounds, report rapid closure, decreased healing time and no dehiscence in over 250 abdominal closures. Most cases concerned one-stage abdominoperineal resection, or colostomy in cases of inoperable carcinoma of the rectum or colon.

In intestinal surgery I use tantalum wire in the form of interrupted stitches on the outer sero-serosa layers (0.005 inch in diameter). On reoperation and in one case at autopsy, 13 months after side-to-side ileotransversostomy, the absence of any adhesions around the site of operation was striking. This finding prompted me to use interrupted fine tantalum wire for closing denuded serosa surfaces within the abdominal cavity. The use of a wire stitch to invert the crushed appendix base securely will prevent leakage and peritonitis.

In wounds potentially infected like colostomy the use of tantalum wire assures a resistant scar without sinus formation as encountered when using silk or cotton. The use of chromic catgut in these cases would result in premature dissolution of the catgut and subsequent hernia formation.

The use of tantalum wire in abdominal surgery as indicated above enables me to observe early ambulation in all patients 24 to 48 hours after operation. This reduces the postoperative vomiting, lessens gas distention, and prevents thrombus formation. Vickers[14] stresses the advantage of wire and early ambulation in war-time surgery. A definite decreased tissue reaction, and increased incisional security are conspicuous with wire as suture material.

In hernioplasty (Bassini, Halsted) I use interrupted tantalum wire to great advantage in preference to silk. In my experience muscles sutured properly to fascia without crushing the muscle will heal with dense fibrous tissue, provided nonabsorbable suture material is used. Silk has been successfully used by Kocher and Halsted. Tantalum wire is now the superior material for any hernioplasty. Kaufman[8] used wire in herniorrhaphies and observed better wound healing.

In panhysterectomy I reinforce the closed vaginal fornix suture with interrupted wire and include the round ligaments in it to assure a secure suspension of the fornix.

In neurologic surgery tantalum wire is used with great success in the repair of peripheral nerves. Spurling, Pudenz,[12] and Schnitker[13] used tantalum (0.003 inch in diameter) as through-and-through sutures in end-to-end anastomosis with minimal foreign body reaction and little interference with the down-growing axones. Pudenz, in experimental studies, inserted silver and tantalum ribbons into the cerebral hemisphere of cats. The animals were sacrificed at intervals of 10 to 148 days. Tantalum clips for hemostasis in the meninges or in nervous tissue showed minimal encapsulation by fibroblasts and neuroglia fibrils. Silver clips, on the other hand, produced an intense inflammatory reaction leading to dense collagenous connective tissue formation similar to the findings in cerebral abscesses.

Powell[11] reports excellent results when using wire in the closure of urologic wounds with the stay suture technic. The suture includes skin, muscles and fascial layers down to the perinephric layer and out the other side in reverse order. The sutures are placed every ½ to 1½ inches. Any drains or tubes are brought out through the posterior end of the wound. All sutures are placed before any are tied. For proper approximation interrupted dermal may be used in the skin. The first sutures were removed after 8 to 10 days, the last one 4 to 6 days later. Quick healing, minimal tissue reaction and good functional results were uniform in Powell's series of 37 cases.

In industrial surgery tantalum wire is the material of choice in all instances where silk or cotton used to be advisable. Wilson and Kaplan[16] report successful use of wire in tendon and nerve injury. They stress the fact that the tensile strength of tantalum in tendon suturing permits early active motion with a minimum of tissue reaction. Olson reports good results with tantalum wire in hand injuries.

The good results with tantalum wire are obtainable only when the following fundamental surgical rules are observed:

1. Gentle handling of tissues with minimal crushing by clamps to avoid subsequent necrosis of tissue and possible site for infection.
2. Exact hemostasis to prevent hematoma formation, another factor for infection.
3. Proper application of sutures in respective layers, thus avoiding creation of empty spaces with formation of seroma. This might again be the source of infection although liberal and uniform sprinkling of sulfa powder throughout the wound or irrigation with normal saline solution, will greatly reduce this danger.

When uniting separated muscle fibers or adapting muscle to fascia, loose approximation is essential. This will avoid the ischemia resulting from the secondary edema in any traumatized muscle with subsequent necrosis and weak or nonunion of the suture.

The use of diathermy or preferably short wave is in my experience a very valuable adjunct in the healing of wounds, inasmuch as it secures persistent arterial hyperemia conducive to rapid healing. Ebeling showed that elevation of temperature increases the rate of healing. He compares the effect of temperature on metabolism and the effect of temperature on chemical reaction which are fundamental to the healing process of wounds.

In all my operations where I used tantalum wire, short wave could be used with no detrimental after-effects. The stimulating action on the reparative process of the wound was quite evident. Together with early ambulation it shortens hospitalization and the length of disability.

Etter and associates,[4] in extensive experiments on animals, proved that tantalum wire embedded in tissues is no contraindication to the use of diathermy or shortwave. No significant difference between the temperature on the side containing the metal and that on the control side were noted after shortwave exposure within therapeutic dosage. Histologic examination of tissues contiguous to the metal did not disclose any significant destructive effects from shortwave. When present they were the result of excessive heating and were on the control side just as pronounced as on the side where the tantalum had been implanted. Lion[10] confirmed the findings of Etter.

The introduction of braided tantalum wire with its greater ease in handling and great tensile strength in fine size, eliminates a disadvantage of the original monofilament tantalum wire.

SUMMARY

Tantalum wire in surgery proves to be a superior nonabsorbable suture material. It is inert in the tissue and assures firm closure of the wound even in the presence of infection. The tensile strength of the wire suture remains constant and allows early ambulation. Shortwav [illegible] a valuable aid

in hastening healing and is not contraindicated when using tantalum wire if the proper technic is observed.

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Cotton as Suture Material in Combination With Catgut*

ANTHONY J. MENDILLO, M.D., F.A.C.S., F.I.C.S. AND
JOHANN KERTESZ, M.D.
NEW HAVEN, CONNECTICUT

IT is not our intention to suggest that cotton is the ideal suture material, or that the technic we have been using is the only correct one. On the other hand, in more than 400 operations where cotton was used, there were no complications such as evisceration, purulent or serous discharge from the wound, or extrusion of cotton knots. For these reasons the presentation of this paper seems to be justified in order to throw some light on the newly-revived controversy on the use of cotton.

The main emphasis will be placed on two points:

1. That cotton may be used as suture material safely and advantageously.
2. That cotton may be used simultaneously with catgut without ill effect.

Before going into a detailed discussion of the cases where cotton was used in our series, it seems appropriate to say a few words in general about our conception of the use of suture material. As long as the surgeon had to resort to heavy catgut in order to compensate for the lack of tensile strength, a fair amount of tissue reaction, and even an occasional infection, were inevitable. Even though this was generally of no serious consequence, a number of surgeons advocated the exclusive use of nonabsorbable suture material. They could prove by a large series that the number of infections was lower with the exclusive use of silk or cotton; that the incisions healed with less reaction, and that the general appearance of the wounds was better than with the use of catgut. But they also had to admit that if infection did set in, sinus formation and extrusion of suture knots could occur.

The objection to the combined use of absorbable and nonabsorbable suture material was unanimous, the rationale being that nonabsorbable material in a potentially irritated wound would lead to more irritation, and in an infected case the sequelae would be more serious than with either type alone.

This was the situation until the increase of tensile strength made possible the use of finest suture material. Today there is little tissue reaction and danger of infection with the use of very fine catgut, and the foreign body reaction and capillarity of nonabsorbable sutures are greatly minimized.

On principle we still prefer to leave behind as little foreign material as possible, but we thought we could benefit from the combined use of both materials, that is, from the holding and nonirritating quality of cotton and the absorbability of catgut.

In spite of the general attitude we did not hesitate to use absorbable and nonabsorbable material in the same wound. We felt that with the careful employment of both materials and the proper technic, the danger would be negligible.

In every case our plan was to evaluate the individual need for nonabsorbable sutures or the advantage of their use; otherwise we would use catgut as before. This strict and critical attitude toward the employment of cotton will explain why many operations were still performed with the exclusive use of catgut. On the other hand, the increasing usefulness of cotton is clearly reflected by the doubling of operations from year to year where this material was used.

At this point it seems appropriate to state briefly the main principles of our operative and suture technic. This seems important because we strongly believe that the contradictory reports on different suture materials are due to a difference in technic rather than to the suture material per se. We are less concerned about breakage than tissue reaction to suture material, which we feel is the main cause for weakening of a suture line. We are also convinced that heavy chromic gut rather than fine sizes will lead to evisceration.

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* The cotton sutures used are the product of Gutebrod Bros. Silk Co., Inc. Comparative sizes are: Cotton O = thread size 40; Cotton A = 30; Cotton B = 20.

Therefore we use the finest possible sutures.

The same principle applies to ligation of vessels. Secondary hemorrhage may be due to slipping of a ligature, but if it occurs around the eighth to tenth postoperative day or later, we attribute it to the fact that the whole distal end of the ligated vessel sloughed off. This may well happen due to severe tissue reaction when the vessel is tied with heavy or multiple chromic ligatures.

In order to obtain clean, reactionless healing it is important to reduce as much as possible the amount of crushed tissue. Therefore, whenever feasible we use small, pointed clamps. Even if we are able to spare only one square millimeter of tissue per clamp, the amount saved at the end of the operation may be considerable. We carefully avoid mass ligatures, large bites of tissue, heavy needles, suturing under tension, and placing sutures too close together.

Even anesthesia plays its part because poor relaxation during closure may force the surgeon to use more and heavier sutures, which in turn may alter the final result.

Today it is a well known fact that good wound healing depends as much on reliable sterility of operating room requisites and chnic as on the patient's balance in serum otein, electrolytes and vitamins. Furthermore, the postoperative treatment and care are considered as important as the surgery itself.

Only if all these basic rules are strictly observed, if possible by one and the same team during the entire period of trial, can the value of a particular suture material be judged correctly.

Below is a tabulation of cases in which cotton sutures were used.

Operation	1944	1945	1946
Hernia repair, all types	51	83	74
Cholecystectomies		6	52
Cholecystogastrostomy			1
Esophagogastrostomy	1		
Gastroenterostomy		1	4
Subtotal Gastrectomy		2	4
Transthoracic Gastrectomy		1	1
Transthoracic Esophago-Gastrectomy			1
Exploration of the Duodenum			1
Duodenectomy			1
Intestinal Obstruction			2
Intestinal Resection		1	7
Miles Resection of Rectum			4
Colostomy			4
Closure of Colostomy		1	3
Exploratory Laparotomy		2	8
Diaphragmatic Eventration		1	
Abdominal Hysterectomy		3	37
Oophorectomy			1
Repair of Cystocele	1	3	4
Perineorrhaphy		4	4
Gilliam Crossen Suspension			7
Olshausen Suspension	1		7
Nephrectomy			1
Transplantation of Both Ureters			2
Cystectomy			1
Exstirpation of Pilonidal Cysts		11	5
Talma Morrison Operation			1
Laceration of Fascia of Biceps			1
Total: 411	54	119	238

In 1944 when we started to employ cotton as suture material, it was used during the entire year for the repair of hernias only. It was our thought that in herniorrhaphies nonabsorbable material would be most desirable, and further, relatively [illegible] catgut would be needed since only a few [illegible] vessels [illegible] encountered. If there [illegible] danger [illegible] the combined use of abso[illegible] non- [illegible] suture material, [illegible] be a [illegible]. Consequently [illegible] ton for the hernial repair proper and catgut for tying off the sac and ligating the vessels.

From the start we did not extend the use of cotton to the repair of all types of hernias. One type where we desisted from the use of cotton is the congenital hernia of infants and children. High ligation of the indirect sac is practically all that is needed for permanent cure. There is no need for displacement of cord structures or for any type of complicated repair. There is also no need for nonabsorbable suture material. The other type is the extremely large traumatic or incisional hernia. To be sure, we have successfully repaired quite a number of traumatic and incisional hernias with the use of cotton, but these were of small or medium size. For the largest ones we used tantalum wire. Its use has many disadvantages in comparison with cotton, but it has certain merits which will not be discussed in this paper.

When after one year of trial every wound had healed by primary intention and no complication had occurred after many months of observation, we started to expand the use of cotton to many more types of operations. Whatever the operation was, we applied the same principle as for hernia repair, namely, to use cotton only in those layers where it was thought to be more advantageous than catgut. As satisfied as we were with our new technic, we have not applied it as a rigid rule, and the same operation was performed sometimes with, and sometimes without cotton.

It would go far beyond the limits of this paper to give the exact account of sutures used in every single operation. We will name instead three procedures where we have used cotton most often and in this way give a general idea as to how this material has been used.

1 Repair of Hernias.
   Hernial sac: plain 0 or chromic 00, single or double, depending on the size.
   Ligation of vessels: chromic 00 to chromic 0000.
   Bassini repair: cotton 0 or cotton B.
   McVey repair: cotton B.
   Plication of transversalis fascia: cotton 0.
   Plication of direct sac: cotton 0 or chromic 00.
   Closure of external oblique aponeurosis, with or without imbrication: cotton 0.
   Mayo repair: cotton 0.
   Skin closure: cotton 0.
2. Closure of Abdomen.
   Peritoneum: chromic 000 double.
   Fascia: cotton 0.
   Skin. cotton 0.
3. Gastroenterostomy, Gastric Resection, Resection of Intestine, Enteroentero Anastomosis.
   Anterior and posterior serosa-serosa sutures: cotton 0.
   Inner lockstitch and Connell stitch: chromic 000 to chromic 00000.
   Closure of duodenum: chromic 000 lockstitch; 2 rows of cotton 0.

The main objection to cotton, as voiced by many surgeons, is its use in cases with frank or potential infection. The only cases in our series where severe infection was present were 8 cholecystectomies for empyema and perforation. We experienced no untoward reaction from the use of cotton for fascial and skin closure in these 8 cases. On the other hand, neither did we have a single complication in a large number of operations, i.e., in closure of colostomies, intestinal resections, and in open anastomoses where cotton was definitely exposed to infection.

Finally, we employed cotton in many operations where we previously had resorted to a heavier chromic gut of slower absorption. For example, routinely we use only catgut for vaginal surgery. In the repair of 8 large cystoceles and rectoceles, we sutured the deep layers with cotton 0, assuming that this would lessen the danger of recurrence. The superficial sutures were chromic 000 as usual. This technic also had the advantage that the patients had much less perineal discomfort postoperatively than with the use of heavy chromic gut. This lack of local reaction by substituting cotton for heavier catgut was one of the main advantages of its use. It was appreciated by both the patient and the surgeon. The wounds actually healed better inasmuch as there was no induration, irritation, or accumulation of serum, so frequently seen with catgut. The patients complained of less pain in their incisions, yet the total amount of nonabsorbable suture material used was very small.

For the past three years we have been ambulating our patients within the first 24 hours after surgery. This was done irrespective of the suture material used at the operation. There was no ill effect from this procedure, and we are under the impression that the group of patients whose laparotomy wounds had been closed with cotton moved around more freely than those where only catgut had been used.

As stated in the beginning of this paper, we do not intend to suggest the use of cotton in combination with catgut as the best and only technic. Not only do we realize that other surgeons may have equally good results with different suture materials, but we also may change again in the future to a new and more promising technic if we think we are able to improve our results. At the present moment we are well satisfied and like the combination of material in use better than the pure catgut technic which the senior author has used in thousands of operations with very good results. But whatever the suture material might be, we want to emphasize that there is no substitute for the most careful and atraumatic technic while operating, and for the most thorough preoperative and postoperative management.

SUMMARY

During the past three years 411 operations were performed using cotton in combination with catgut as suture material. These included hernial repair, gynecologic operations, and intestinal resections and anastomoses.

There was not a single incident of untoward effect of cotton. All wounds healed by primary intention, with good cosmetic result.

Use of Portacaval Shunts in the Management of Portal Hypertension

JERE W. LORD, JR., M.D., F.A.C.S.
NEW YORK, N. Y.

THE cycle is complete. In 1943 Whipple[1] and Blakemore[2] performed the first successful portacaval shunt for portal hypertension, employing the vitallium tube technic of Blakemore and Lord.[3] After some 20 patients with portal hypertension due to cirrhosis of the liver or Banti's syndrome had been operated upon in a similar fashion Blalock[4] redirected interest to the suture technic for the anastomosis of the end of the portal vein to the side of the inferior vena cava and the end of the splenic vein to the side of the renal vein. From the time of Nicolai Eck,[5] who first performed the operation experimentally, many attempts to suture the portal vein or some of its branches had been made. All of the reported cases checked by autopsy proved unsuccessful. In a careful series of experiments one of Blalock's associates, Johns,[6] demonstrated in dogs that an end-to-side suture anastomosis of the splenic vein to the renal vein was successful more frequently than an end-to-end suture anastomosis, which in turn proved superior to the end-to-end vitallium tube technic. This experimental data, plus the facts that end-to-side splenorenal anastomosis preserves the left kidney and that in the vitallium tube method 2 cm. more of vein is necessary for a successful anastomosis than with the suture method, have lead to the current practice of suturing the veins employed in the shunts in an end-to-side fashion.

Let us examine the two basic operative technics for the relief of portal hypertension. Figure 1 shows diagrammatically an anastomosis between the portal vein and the inferior vena cava using a vitallium tube. As stated earlier, we now join the two vessels by a continuous everting mattress suture similar to the one used for joining the ends of the aorta after excision of the stenosed area in coarctation of the aorta (Fig. 2). This method is also precisely the same as the one Dr. Blalock has employed so successfully in his operation for congenital pulmonary stenosis in which he anastomoses the end of the subclavian or innominate artery to the side of the pulmonary artery. Figure 3 shows diagrammatically the procedure of splenorenal anastomosis which is used in patients with Banti's syndrome (extrahepatic portal block) and in some cases of cirrhosis of the liver. We now leave the kidney in situ and join the end of the splenic vein to the side of the renal vein.

While we are still on the subject of technic let us examine another operative procedure which is of value in the management of intractable ascites due to cirrhosis of the liver. It is useful in patients who are poor operative risks and who could not possibly survive an operation of the magnitude of a portacaval anastomosis. The operation referred to was ably described by Crosby and Cooney[7] in October 1946. They make no claim of originality but did modify the construction of the button so that omentum cannot plug its in-

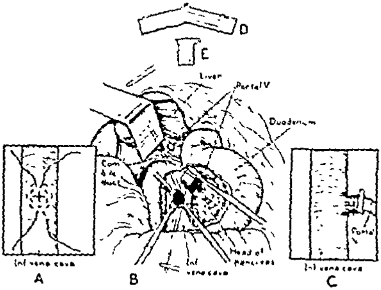

Fig. 1. A, illustrating placement of the pursestring sutures in the inferior vena cava and the centering of the cruciate incision for the implantation of the vitallium tube bearing the portal vein. B shows the tube bearing the portal vein about to be introduced through the opening in the vena cava. C, the completed anastomosis. Note the wall of the vena cava is drawn well up on the vitallium tube. D, a tube suitable in design for vein graft bridging. E, a late design double-ridge tube with a holding tab. Instead of using the vitallium tube method of anastomosing the end of the portal vein to the side of the inferior vena cava we now use the suture method of anastomosis.

ternal opening. Crosby and Cooney reported 6 cases that were moderately or markedly improved following operation. The principle of the procedure is to permit the ascitic fluid to escape from the peritoneal cavity through a hollow glass button to a subcutaneous pocket where it is absorbed as edema fluid. In this way the patient is spared repeated paracenteses and the protein content of the fluid is not lost. The author had occasion to see in consultation a cirrhotic suffering from intractable ascites who had been subjected to the Crosby-Cooney operation. The patient had been greatly relieved for a period of two months but then ascitic fluid began to reaccumulate rapidly, necessitating repeated paracenteses. Presumably the lymphatics in the subcutaneous fatty tissues had become blocked. In discussing the case with Dr. Irving S. Wright he pointed out the fact that fascial removal was desirable in procedures designed to relieve advanced lymphedema of the leg. When the deep fascia was removed the lymphatics of the muscles were valuable in the absorption of edema fluid. The author[8] has recently described an operation which modifies the Crosby-Cooney procedure by adding a widespread fasciotomy of the abdominal muscles to the area where the button is inserted. The first patient operated upon by this method will be discussed later.

Portal hypertension may be due to intrahepatic or extrahepatic block. The classical example of intrahepatic block of the portal vein is Laennec's cirrhosis. Extrahepatic block (Banti's syndrome) may occur in the portal vein or in the splenic vein. The block may be due to thrombosis in, or cavernomatous transformation of, the portal vein. Normal blood pressure in the portal system varies between 80 to 100 mm. of water. In cases of portal hypertension the pressure usually is in the neighborhood of 300 mm. of water and occasionally has been observed to be as high as 600 mm. Pressures are taken at the time

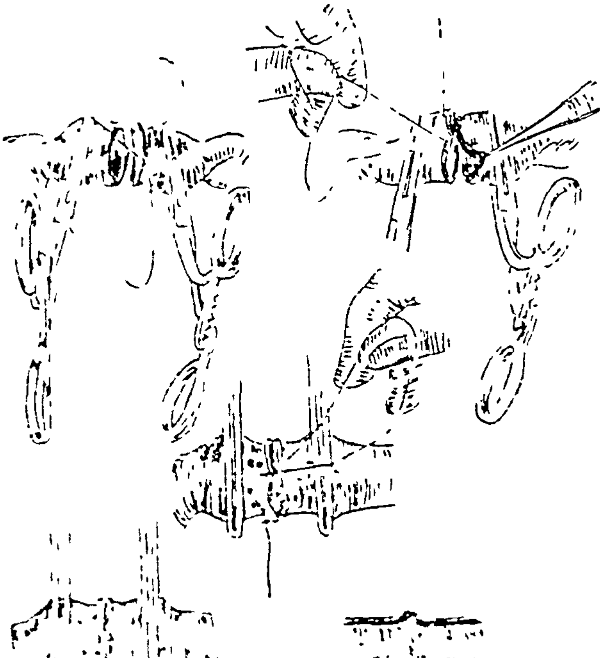

Fig. 2. Taken from a drawing by Gross and Hufnagel (New England Journal of Medicine, September, 1945), showing the method of joining the cut ends of the [illegible]. A continuous everting mattress suture bringing [illegible] is placed. In the end to side [illegible] of the splenic and renal veins we inter[illegible] at three points. [illegible] Dr. [illegible] is used.

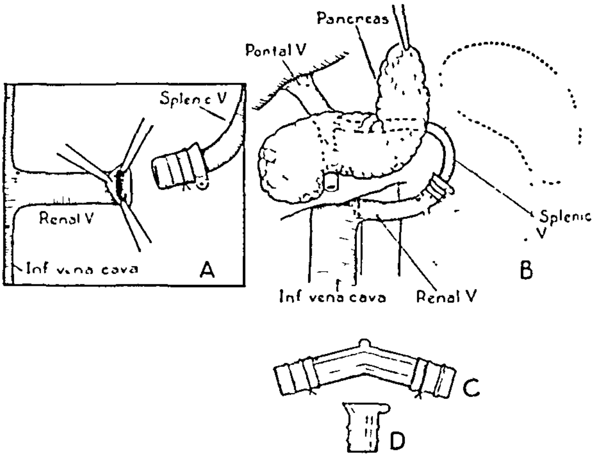

Fig. 3. A, illustrating the method of everting the renal vein for the introduction of the vitallium tube bearing the splenic vein. *The clamp on the flanged* portion of the vitallium tube for its guidance and the rubber shod clamps upon the splenic and renal veins have been omitted. B is a semidiagrammatic sketch of the completed anastomosis. Note the placement of the ligatures upon the vitallium tube. C, a vitallium tube with a vein graft mounted. D, an improved design of vitallium tube for end-to end or end to side splenorenal anastomosis. There are two tying ridges placed 2 and 4 mm. respectively from the end. Note the tab on the flange for the application of a holding clamp. Instead of the vitallium tube method of anastomosing the splenic and renal veins we now use the suture method of anastomosis, joining the end of the splenic vein to the side of the renal vein.

of operation from one of the branches of the epiploic or coronary veins and a simple venous pressure apparatus is all that is necessary.[*]

Clinically, portal hypertension manifests itself in one of two ways. Because of partial or complete block of the portal or splenic vein a widespread collateral circulation develops and part of this collateral system is evidenced by the presence of esophageal varices. Hemorrhage from one of these varices is one of the predominant symptoms of Banti's syndrome and is also frequently noted in cases of cirrhosis of the liver. It is also of importance clinically that massive and repeated hemorrhage is the most common cause of fatalities in Banti's syndrome and probably next to cholemia is the most frequent cause of death in patients suffering from cirrhosis of the liver. The second clinical sign of portal hypertension is ascites. Now many patients with cirrhosis have ascites largely due to low levels of serum albumin and comprehensive and intensive therapy to improve liver function along modern lines will raise the level of the albumin and eradicate the ascitic factor. A moderate number of cirrhotics, however, owe their ascites not to low levels of serum albumin but rather to the strangulation of the tiny radicles of the portal vein in each portal space by the proliferative fibrosis, so much a factor in the pathologic picture of portal cirrhosis. It is in this group that intractable ascites is noted in spite of the best of dietary management over prolonged periods.

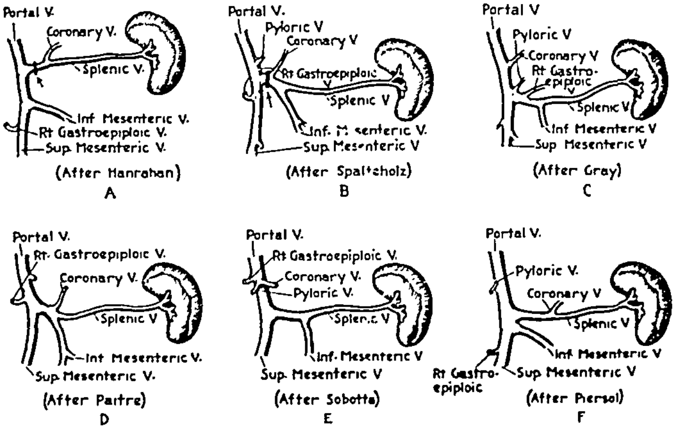

Fig. 4. Variations in the anatomic pattern of the portal system, illustrating how an obstructive factor of the same site in different individuals may result in marked differences in clinical behavior.

At the present time the indications for surgery and the technic employed are as follows: (1) In patients with Banti's syndrome who have hemorrhaged and/or have evidence of esophageal varices we perform a splenorenal end-to-side anastomosis associated with the removal of the spleen. We believe that splenectomy alone should *never* be employed for the treatment of Banti's syndrome without proof that the block is in the splenic vein distal to the coronary vein. In Figure 4 the anatomy of the portal venous system is diagramed by six different authors. We see that there is considerable variation in each drawing. The importance of this fact is that the coronary vein may vary widely in relation to the site of thrombosis or block and if the coronary vein enters on the hepatic side of the block then simple splenectomy will be curative. Of course, such a patient would not give a history of hemorrhage but rather would exhibit the other signs of Banti's syndrome, i.e., splenomegaly, leukopenia, anemia and thrombocytopenia. If a splenectomy has already been performed on a patient with Banti's syndrome and the block is proximal to the coronary vein, then secondary operation to anastomose a branch of the portal vein to the inferior vena cava or one of its branches is much more difficult. (2) The second indication for surgical intervention is in patients with cirrhosis of the liver who have hemorrhaged and/or have esophageal varices. Two operative procedures are available in this instance: either an anastomosis between the end of the portal vein and the side of the vena cava or an anastomosis between the end of the splenic vein (after splenectomy) and the side of the renal vein. The former operation is more difficult technically but does provide for a larger shunt. At present we favor the splenorenal procedure. (3) The third indication is intractable ascites due to cirrhoses of the liver. If the ascites is associated with esophageal varices then a splenorenal shunt should be employed. But if there is no history of hemorrhage and no evidence of esophageal varices then the modified Crosby-Cooney button operation with fasciotomy should be utilized.

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[*] Made by Becton Dickinson. A Lindemann needle is also useful.

What are the contraindications to portacaval shunts? First, evidence of an active hepatitis superimposed on the cirrhotic process. If there is significant jaundice, if the cephalin flocculation and thymol turbidity tests are strongly positive, and if there is prolongation of the prothrombin time which fails to respond to vitamin K,[9] then such a patient is a poor operative risk. With careful treatment including prolonged bed rest occasionally the hepatitis will subside and the patient may become a suitable candidate for surgical intervention.

A second contraindication is any patient who is a poor surgical risk on grounds other than hepatic insufficiency, such as poor cardiac reserve, advanced age, or poor renal function. Both of the operative procedures for the establishment of portacaval shunts are of considerable magnitude, usually lasting from 4 to 7 hours and, because of the marked collateral circulation, require from 1500 to 4000 cc. of blood during the operation. On the other hand the button operation is simple to do, requires less than one hour to perform and is tolerated well by poor risk patients.

Statistical analysis of the results of portacaval shunts is not possible as yet because of the relatively small number subjected to operation and because of the short term follow-up. As is clearly evident surgical intervention is carried out only on patients whose outlook *without operation is extremely grave*. It is well known that patients with cirrhosis and patients with Banti's syndrome who have had massive hemorrhages or intractable ascites have a desperate outlook when treated conservatively. For this reason any procedure which may lower the level of the portal hypertension is worthy of consideration. Measurements of the portal pressure after anastomosis before closure of the abdomen often show a reduction of 150 to 200 mm. of water. The pressure rarely returns entirely to normal, however, and hence some of the patients have experienced postoperative hemorrhages although the magnitude and frequency of the bleeding episodes were significantly reduced. In almost every instance when ascites was a major problem preoperatively there has been no reaccumulation of fluid after the first 3 months postoperatively.

Whipple, Blakemore and their associates have performed portacaval shunts on some 40 patients, Linton[10] on 15 and the author has carried out shunts on 6 additional patients. The postoperative hospital mortality for the 61 patients has been approximately 20 per cent. We believe with improvement in the selection of cases, emphasis on the end-to-side splenorenal anastomosis and greater operative experience the mortality will be reduced substantially.

The first patient operated upon by the author for intractable ascites employing the Crosby-Cooney procedure modified by the addition of a fasciotomy was a 55-year-old Chinese who had a large painful umbilical hernia and an enormous amount of fluid in his

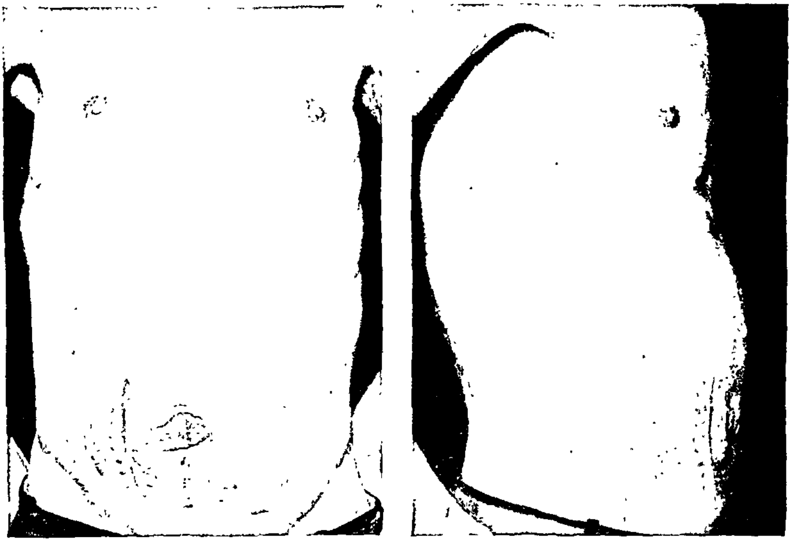

Fig. 5.·Anterior and lateral views of patient three and a half months postoperatively. The umbilical hernia is flat and the subcutaneous pocket has disappeared. There is no evidence of ascites.

abdomen. Work-up revealed fairly good liver function and a serum protein level of 6.5 Gm. per cent with an albumin-globulin ratio of 2.8 Gm. and 3.7 Gm. His heart was fibrillating and he appeared to be too poor a surgical risk for a portacaval shunt. Table 1 shows the frequency of paracenteses and quantity removed during his hospitalization. Good dietary therapy and digitalization did not influence the rate of formation of ascitic fluid. On March 20, 1947, he was operated upon and by the twenty-eighth postoperative day not only was there no evidence of ascitic fluid but also the fluid in the subcutaneous pocket had absorbed. The patient never showed ankle or scrotal edema during the early postoperative period as had the patients of Crosby and Cooney. Figure 5 A and B show the patient three and a half months postoperatively. At this time the serum proteins were 7.3 Gm. per cent with an albumin-globulin ratio of 4.0 Gm. and 3.3 Gm. The cephalin flocculation test was still 3 plus. The most recent examination some five and a half months postoperatively revealed him to be in excellent health, the umbilical hernia flat, and no evidence of ascites.

TABLE 1. DATES AND VOLUMES OF PARACENTESES.

Date	Volume in cc.
10/5/46	9200
10/11/46	2500
10/26/46	7250
11/20/46	10000
12/5/46	11000
12/16/46	9500
1/18/47	6500
1/29/47	10000
2/4/47	8500
2/14/47	9500
2/26/47	4500
3/7/47	4000

Resection of the Rectosigmoid Region With Preservation of the Anal Sphincter[*]

CHARLES STANLEY WHITE, M.D., F.A.C.S., F.I.C.S.
WASHINGTON, D. C.

WHILE surgery for the eradication of carcinoma in various areas and organs of the body has approached standardization, with minor refinements being constantly proposed, the rectosigmoid region remains in a controversial realm, particularly in reference to the preservation of the anal sphincter. Seemingly, time has not lessened the intensity of the debate, the fire and energy of which has produced light of a variable modality. Reduced to simple propositions it amounts to this:

Is it possible to remove adequately the involved segment of the rectosigmoid region without sacrificing the sphincter, and at the same time maintain the same percentage of five-year cures reported by outstanding operators in this field? Can assurance be given that the operation is sound technically and that a functioning sphincter will remain?

It is recorded that in the United States alone there are 160,000 deaths annually from cancer, of which 8 per cent, or 12,800, originate in the rectosigmoid region. (Add to this number the 3,200, or about 25 per cent, who have been cured by appropriate surgery, and we have under discussion the fate of 16,000 persons annually.) It is a matter of common knowledge that among laymen the dread of a colostomy veers many to forms of treatment, or lack of treatment, which dooms them to an untimely death. The reluctance to seek surgery, unfortunately, is not confined to laymen, for many physicians share the same view and paint a Frankenstein picture of a colostomy, through ignorance or failure to make an early diagnosis. While a colostomy is not a thing of beauty, it may be a joy forever Many intelligent patients pursue gainful occupations, enjoy life, and are never suspected of being the unproud possessors of artificial ani. Nevertheless, between a normal functional sphincter and a colostomy, there can be but one choice. The demand for something better has an esthetic and practical basis.

Carcinoma of the rectosigmoid usually is slow in its growth and is recognized easily by the methods at our disposal. It offers an opportunity for cure because it remains well localized and metastasis is not rapid in most instances. Lesions in this region become inoperable by direct extension to adjacent organs or by metastasis. Liver involvement by way of the portal vein occurs frequently enough, unfortunately, to be a matter of great concern. Occasionally the latter complication occurs before lymphatic nodes are found in the vicinity of the primary lesion; in fact, it may occur before a bowel involvement is even suspected. (Miles,[1] in his Lattsomian lectures in 1926, cited 2 cases in which metastases were found in the liver at necropsy, but the primary growth in the rectum had involved less than half the circumference of the bowel and therefore was considered an early stage. In neither case was there an extramural lymphatic spread; nor was the liver enlarged or the seat of metastases. He writes, "It is fortunate that dissemination by the veins is very rarely encountered so that in practice we can disregard the possibilities of its occurrence." We do not believe the modern pathologist will concur in this last statement.)

The lymphatic system is the avenue which the surgeon seeks to barricade by operation, and it would not be amiss to sketch briefly the lymphatics in the region under consideration. The system consists of fine channels from anus to sigmoid in the submucous, muscular, and subserous coats of the bowel. The flow of lymph is transverse to the long axis of the gut until it reaches the pararectal nodes (the nodes of Gerota), when they gather in distinct channels with small glands at frequent intervals and then follow *upward* the course of the vascular system. The lymphatics are divided into th [illegible] of t [illegible] erior and middle group and a superior group. In the former, the current is upward, without communication with any pelvic organ, joining the trunks of the superior region which drain the upper rectum and sigmoid. The involvement of the lymphatics and the extension is transversely through the submucous, muscular, and subserous lymph channels until it emerges in small collecting lymphatics, converging into larger trunks and nodes with the current always cephalad. This is not a theory, but a demonstrable fact.

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[*] Read before the Twelfth National Assembly, United States Chapter, International College of Surgeons, Chicago, Sept. 29-Oct. 4, 1947.

Dukes' classification,[2] announced in 1932, has been looked upon as a model and was based on 215 cases of the Miles type of operation. To quote, "A cases are those in which carcinoma is limited to the wall of the rectum, there being no extension into the extrarectal tissues and no metastasis in the lymph nodes; B cases in which the carcinoma has spread by direct continuity to the extrarectal tissues but has not invaded the regional nodes; and C cases in which the metastases are present in the regional lymph nodes. . . . There is no relationship between the surface area of the growth and the depth of penetration." Eight years later Dukes[3] reported an analysis of 1,000 cases of carcinoma of the rectum. He did not define clearly the anatomic or surgical involvement, but it comprised those cases in which the Miles operation was employed. In his earlier report Dukes made no reference whatsoever to metastases by way of the veins, but in 1940 he says, "The extension of rectal cancer by venous channels has received relatively little attention in routine pathological investigations, yet in view of secondary growths in the liver, venous spread is obviously of the first importance. Of course, data as to venous spread obtained in this way have not the same precision as information concerning local spread and lymphatic metastasis. . . . If dissection reveals cancerous deposits within veins, then this is evidence of probable venous dissemination, but the nondiscovery of intravascular growth does not exclude the possibility of venous spread, since emboli may already have been carried away in the blood stream, leaving no trace behind. . . . Evidence of extension of growth [illegible] within the lumen of hemorrhoidal veins was found in 17.8 per cent of the 539 cases in which the veins were dissected and examined microscopically."

Glover and Waugh[4] of the Mayo Clinic have made an outstanding contribution to the problem of metastasis in carcinoma of the rectosigmoid region. I do not believe any study of the subject in recent years remotely approaches the thoroughness of their work which, incidentally, upsets some accepted theories concerning the secondary invasion by carcinoma in this region. They selected 100 cases in which abdominoperineal resections were done and meticulously examined every specimen in reference to its lymphatic dissemination. In addition, they analyzed the operative reports and case histories. Microscopic sections were made of 1339 nodes. In 20 per cent of the cases carcinoma had invaded the vascular system and confirmed what others had noted; namely, this complication often precedes the nodal involvement. The invasion of the venous vessels is not the result of a growth of long standing or extensive involvement, but it has its origin while the growth is still confined to the bowel. The importance of early diagnosis and treatment becomes self-evident.

In only 1 per cent of the cases were there any involved nodes more than 2 cm. below the visible or palpable border of the growth, except in those cases in which the higher lymph channels were blocked by malignant cells, permitting no additional invasion, but shunted the cells to areas below the growth. In the analysis of more than 239 of the 507 cases in literature in which the removed tissues were examined, these authors found that only 8 cases showed involvement below the growth and only one showed involvement more than 2 cm. below. The authors state, "One case, therefore, that of Gilchrist and David, in which the involved node was 4 cm. below the lesion, represents the total significant retrograde lymphatic flow from carcinoma of the rectum contained to date in the literature. . . . If this obtains so rarely in cases in which the patient is already doomed to early demise, because of the advanced nature of the lesion, one may be justified in making the statement that retrograde lymphatic metastasis *never* occurs from growths still in the stage of reasonable operability."

Seefeld and Bargen[5] expressed the opinion that lymph nodes are poor indicators of visceral metastatic lesions which are often present independent of metastatic nodes. Intravascular invasion means as much from a prognostic standpoint as neoplastic nodes, and its absence means much more. In 100 cases of rectal carcinoma, lymph nodes were involved in 30 per cent, veins in 20 per cent, and nerve trunks in 30 per cent. Venous and nodal dissemination occurs more often in the young, while neural invasion is not related to age.

Surgery offers the only hope of cure in carcinoma of the rectosigmoid region, and by its early employment a creditable number of cures are obtained In our zeal to circumvent metastasis via lymphatics, undue stress has been laid upon the necessity of removing the sphincter, levators, and anus. Investigators have demonstrated beyond any reasonable doubt that less than 1 per cent of the operable cases have a nodal extension more than 2 cm. below the growth and a resection below this level does not increase the risk of recurrence. Curative surgery is concerned in removing the primary growth and all possible metastases, and it follows that removal of the anus and substitution of a colostomy cannot increase the cures more than 1 per cent without taking into consideration the slight additional risk and colostomizing the patient. It is in the light of these facts that we believe a sphincter-saving operation is justified. Perhaps the initial objection is the danger of an open anastomosis. It is about time that we took stock of the time-honored closed anastomosis. A definite trend in that direction has received the support of Allen[6] and other operators, and we should profit by their experience and apply their methods. Dixon[7] has developed a technic for end-to-end anastomosis within the abdomen for carcinoma in the rectosigmoid region which in his hands at least has warranted its more general use. He states, "The risk entailed in the operation is appreciable, but the mortality is lower than that accompanying the combined abdominoperineal operation. Beyond all question the procedure I have described herein is far more acceptable to the patient and probably is as actually effective as the combined procedure, which generally is considered more radical. The type of operation which I carry out has been employed for the eradication of lesions situated in the rectosigmoid, or at, or near, the pelvic peritoneal floor, where obviously any type of exteriorization procedure is impossible."

McNealy and Lands[8] report 34 (consecutive) resections by the open method with but two deaths, neither of which could be attributed to the operation per se. The so-called closed method, they state, has left a diaphragm which has been a source of secondary obstruction. They call attention to the importance of the preoperative preparation in this type of anastomosis and conclude with this statement: "The shortened hospital stay, the elimination of multiple operations, the saving in time, expense, and psychologic trauma together with the low mortality, make the procedure of resection with primary open anastomosis one of choice or at least one to be recommended in resectable nonobstructive carcinoma of the colon."

Concerning the second proposition: Can assurance be given that the operation is technically sound and a functioning sphincter remain? This question can be answered in the affirmative chiefly because chemotherapy has entered the field as the first surgical assistant.

The early attempts to preserve the sphincter seem enveloped in a literary fog, but Hochenegg is credited with the first authenticated technic to master the so-called "pull through" operation. Some, like Kraske, made no attempt to preserve the sphincter, but others made sporadic efforts to do so, with indifferent success. A survey of the contributions of these operators discloses that the anastomoses were leaky and fistulae were common; gangrene and sloughing of the upper segment were both frequent and devastating. The posterior resection alone, with preservation of the sphincter, as suggested by Mahoner,[9] left much to be desired. No opportunity was furnished with this method to determine the full extent of the malignancy, presence of metastases, or observance of other possible pathologic conditions which could evaluate the operability or the prognosis. In other words, only half the picture, and possibly the less vital part, was presented through the rear approach. Control of hemorrhage and protection of the pelvic contents were obstacles which severely taxed the ability of the operator. The methods of anastomosis in the earlier days lacked the finesse of modern standards, consequently the forbidding mortality reverted the operation to the abdominal or combined method. Recently there has been a revival of the posterior type of operation as noted by Jenkins[10] and D'Allaines and DeVernejoul,[11] but sufficient time has not elapsed to weigh it on a five-year basis. A combination of the abdominal and perineal route without sacrificing the sphincter has much to recommend it, provided the operative mortality and extension of life closely parallels that of the radical operation as practiced by Jones, Lahey, and other supersurgeons. The statement has been made that a three-year life with a competent sphincter is more desirable than a five-year life with a colostomy, but I am not in accord with such sentiments.

Babcock and Bacon probably have contributed more than any other group to advance the surgery of the rectosigmoid and sigmoid with the maintenance of the integrity of the sphincter as the objective. Babcock has not hesitated to modify the operation from time to time and point out the deficiencies of the earlier ones. In all candor it must be said that many other surgeons have not been entirely satisfied with the results of the pull-through operation because it seems impossible to predict, with reasonable accuracy, whether the patient will have normal control, incontinence, or a stricture. The fault may lie with the operator and not the operation. On the other hand, there is rarely any doubt about the behavior of a colostomy.

I wish to submit for consideration an operation for which no originality is claimed. It [illegible] have been in the repertoire of Hippocrates, [illegible] is one that is particularly applicable to [illegible] rectosigmoid lesions from 6 to 15 cm. [illegible]. It is possible that it can be used in even higher lesions, as Bacon has made the statement that he has succeeded in pulling the transverse colon through the anus in his type of operation. In this lower area it is next to impossible to exteriorize the growth, and an end-to-end anastomosis is unusually difficult. The method of Dixon is necessary to accomplish it, and few are as adept as he.

The success of the operation depends on the operability, the technical capacity of the surgeon, and especially the preoperative preparation. It is almost needless to state that no resection should be undertaken in the presence of an acute obstruction. The bowel must be deflated, essentially empty, and any fluid contents which may be present must be rendered innocuous. All of this is possible.

PREOPERATIVE PREPARATION

The routine check-up of the patient is a prerequisite that requires no comment, and any deficiencies should be met by appropriate treatment, even if it necessitates postponing the operation. For five days prior to operation the patient is given daily 15 tablets of sulfathalidine, 1.5 Gm. each, in divided doses. (Preferably the patient is hospitalized.) A nonresidue diet is permitted for three days. Two days prior to operation magnesium sulfate is administered night and morning and an enema the day before and the day of the operation. The dose of Epsom salts may be modified to meet the individual need, but copious movements should be attained. Streptomycin in 0.5 Gm. doses should be administered by mouth every six hours on the two days prior to operation. There is no deviation from the administration of sulfathaladine and streptomycin. If catharsis has been excessive, intravenous fluids are indicated. Only liquid diet is permitted in the last 24 hours.

Spinal anesthesia with sodium pentothal intravenously is my anesthetic of choice. Curare (Intocostrin) is used occasionally but not routinely during the operation.

OPERATION

With the patient in the Trendelenberg position, a generous incision is made in the lower midline, usually extending above the umbilicus. After the abdomen is thoroughly explored and the condition considered operable, the peritoneum is freed laterally from the rectosigmoid and upward on the sigmoid to permit free mobilization of the area to be resected and displaced. The superior hemorrhoidal vessels are divided between two ligatures, and the peritoneum at the junction with the bladder (a male patient, we assume) is attached. The operation is advanced by completely liberating the bowel from its pelvic attachments, including as much adipose tissue as possible and tying the smaller hemorrhoidal vessels as they are approached. A common error is the failure to mobilize the bowel down to the tip of the coccyx and severing the levator stalks on either side. The failure to do so only adds to the task in the second phase of the operation. In loosening up the bowel an opportunity is presented to estimate the extent of involvement and the amount of bowel to be resected. This is acquired only by experience. I pass a silk suture as a marker through the outer wall of the gut where I expect to make the high transection, noting that the circulation is unimpaired above that point. The bowel is replaced in the pelvis and a new peritoneal floor is made from the lateral peritoneum and bladder reflection, closing it neatly about the sigmoid. The abdominal wound is closed without drainage, using steel wire or tantalum filament in the fascia and skin. The patient is then turned over, the table flexed and the patient assumes a semijackknife position. The buttocks are the most elevated parts and can be held apart by adhesive to give better exposure for the next operative field.

An incision is made from the middle of the sacrum to the perianal margin in the midline. This is deepened. The coccyx and the fifth and fourth sacral segments are removed with a bone cutting forceps. The sacral vessels lie close to the anterior surface of the bone and are ligated and divided at this time. The presacral fascia is then divided in the midline, the wound well retracted and entrance into the pelvic cavity follows. The mobilized bowel is easily secured and delivered through the wound with the identifying suture marking the line of proposed division of the bowel. At the two places where the bowel will be transected they should be prepared for anastomosis by removing tags of fat and epiploica until clean surfaces are obtained. The lower point will be 6 cm. or less from the anus, and the upper point 15 cm. or more, depending on the judgment of the operator and to what extent the bowel has been mobilized. The bowel is divided between Stone clamps, which are then removed and the open ends of the bowel approximated; if the abdominal part of the operation has been properly executed, the approximation is without tension. A guy suture on each side retains the bowel in a position for an open anastomosis, and any accepted method can be used. I prefer fine chromic catgut on eyeless needles, curved or straight. The first or posterior row, in the present position of the patient, is of the Lembert type and joins the serous surfaces together for half the circumference. The next row, immediately superior to the first row, is through all coats of both bowels and is of the locking type. These two rows complete half the anastomosis, the posterior half, as the patient lies on the table, but in reality is the anterior half when he assumes a recumbent position. At this point a soft rectal tube is passed through the anus a few centimeters beyond the incomplete anastomosis and anchored by a silk suture through the skin in the perianal region. I believe this is preferable to passing the tube after the anastomosis is completed, as its visible introduction is an insurance against injury. I am not convinced that a rectal tube is necessary and may abandon its use. The third row of sutures is of the Connell type through all coats of the bowel and the fourth is of the Lembert type, and this completes the anastomosis The guy sutures are removed, the bowel replaced in the pelvis, and the wound is closed. Tantalum filament is used in the skin and a small cigarette or Penrose drain is placed in the lower end of the wound.

Postoperatively the Wangensteen tube is a routine must for two or three days, during which time the patient is allowed water and some clear fluids in satisfying amounts. Fluids are administered parenterally to the extent of 3,000 to 4,000 cc. daily and consist of glucose in saline or distilled water and protein hydrolysate. The intravenous solutions are gradually reduced in quantity as the gastric absorption becomes evident. For the relief of pain I prefer demerol or dolophine but have found occasional supplemental doses of morphine most welcome by the patient. Blood and plasma are used only as indicated; the same holds for vitamins, although I am somewhat hazy on the indications for the latter.

I believe in early mobilization and early ambulation. By mobilization, if the word can be used in this sense, I mean that the patient should move his arms and legs freely and turn frequently in bed with or without assistance. The patient is propped up in bed on the second and third days. On the fourth and fifth days he sits on the side of the bed and exercises his legs, and on the sixth day he is up in a comfortable chair. Mineral oil is given on the fourth and fifth day and, if ineffectual, is replaced by castor oil combined with paregoric, and occasionally prostigmine is given at six-hour intervals on the sixth and seventh days. An enema is not used before the eighth day, and rather than delegate its administration to some disinterested person, I am inclined to dispense altogether with enemas.

Outside the technic of the operation, nothing is so important as the preparation, which may be altered, but never slighted. It is my firm belief that the open anastomosis carries a negligible risk if chemotherapy is vigorously used. If infection can be eliminated, the mortality can be kept remarkably low, and that this is possible has been amply proved. Poth[12] found that after the sufficient use of sulfasuxidine for 42 days a third of the diameter of the bowel could be divided and dropped back into the abdomen without suturing, and 80 per cent of the animals would survive. He stated further, "Evidence accumulating over the past five years indicates that sulfasuxidine and sulfathalidine when properly administered are bacteriostatic [illegible] will sufficiently modify the bacterial [illegible] of the bowel contents, allow a [illegible] mechanical preparation of the colon, favor early healing of the colon at the line of suture and reduce the incidence of postoperative peritonitis and wound infection."

Romanski[13] states that the administration by mouth of 0.5 Gm. of streptomycin four times daily on two successive days will act as an efficient bacteriostatic. Penicillin does not accelerate the action of sulfathalidine or sulfasuxidine, but on the contrary, is antagonistic to some extent. We have not used it preoperatively, nor do we believe it is necessary postoperatively, without specific indications, although its prophylactic use may be endorsed. We have every reason to believe that antibiotics have given so much to intestinal surgery that we are entering an era in which some of our former practices will be profoundly altered, one of which will be the substitution of the open for the closed anastomosis.

CONCLUSIONS

There is abundant pathologic evidence that primary lymphatic metastasis extends less than 2 cm. below the malignancy of the rectosigmoid in less than 1 per cent of the cases. Resection more than 2 cm. below the growth permits preservation of a functioning anal sphincter. A combined abdominococcosacral operation permits a complete survey of the abdomen, radical resection, hemostasis, and negligible risk of infection. The posterior open anastomosis presents no unusual technical difficulty and with rational preoperative employment of sulfathalidine and streptomycin, is a safe procedure.

The immediate mortality is not higher than that of other radical operations for the same disease, but the convalescent period is curtailed; a colostomy is eliminated and a functioning sphincter remains. Whether five-year cures will compare favorably with other types of rectosigmoid resections is an open question which could be best answered by the College * setting up a registry for this disease.

The basis for my opinions concerning rectosigmoid carcinoma at present rests on data from the larger clinics and centers, which of necessity is not a true cross-section of the

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* The International College of Surgeons.

immediate or remote mortality. A very large number of cases, probably the majority, are not reported. If such a registry were organized and members of the College reported their cases with all essential details, in the matter of six or seven years we would have accumulated invaluable records upon which surgery could advance with that directness and crystal clearness which is a requisite of superlative surgery, with less than which we should not be content.

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Aseptic Necrosis of Bone Following Trauma*†

EDWARD L. COMPERE, M.D., F.I.C.S., F.A.C.S.
CHICAGO, ILLINOIS

DEATH of bone will result from any condition which interrupts the blood supply to a segment of bone so completely that minimal oxidation and nutrition of the bone cells cannot be maintained. Death of the head of the femur has resulted from fracture of the intracapsular femoral neck or dislocation of the hip.[1] Aseptic necrosis of small bones, such as the tarsal or carpal scaphoid, or semilunar bones, and of epiphyses at the distal end of the metatarsal bones have been described.[2] These are the more commonly recognized locations for aseptic necrosis of bone following trauma. Death of the body of the astragalus following fracture or fracture dislocation, and death of large fragments in segmental fractures of the long bones has been described by Phemister, [1, 3] but the clinical significance of traumatic devitalization of bone has not been recognized by all fracture and orthopedic surgeons.

Johnson [4] has studied the blood supply to the larger long bones. He found that the diaphyses of the bones are nourished by (1) the nutrient artery which penetrates the cortex in the middle third of the shaft, and branches to extend toward both ends of the bone, (2) the metaphyseal vessels, a branching network of small arterioles which penetrate the cancellous bone near the ends of the shaft and extend into the medullary tissue; and (3) the periosteal blood supply which nourishes the outer half of the cortex and is least important of the three.

A large fragment in a comminuted fracture of the femur, tibia, humerus or one of the bones of the forearm may be so detached from surrounding soft tissue that nutrient, metaphyseal and periosteal blood vessels supplying the fragment are detached from it. In such cases the segmental fragment and sometimes the ends of the two major fragments are so devitalized that they are in the same situation as a full thickness autogenous bone graft (Fig. 1). Axhausen [5] showed that periosteum and at least some endosteum of bone transplants survive and take active part in generating new bone. As is true of the bone graft, most of the bone cells of a large fracture fragment die. Active hyperemia of adjacent bone and soft tissue follows the injury. Some peripheral bone cells survive. Other adjacent bone tissues become active. A vascular fibrous stroma invades the necrotic bone and aids in absorption. There are large phagocytic cells which resorb dead marrow. The resorption by invasion of phagocytes and fibrous tissue is followed by bone formation. Both processes are going on at the same time. This transformation is very slow and may require years until new bone with haversian canals and medullary red bone marrow has replaced the old necrotic bone and the intervening callus (Fig. 2)

Phemister [1, 3] has most accurately described this method of bone absorption and replacement, and has called it "creeping substitution." In all instances of aseptic necrosis, union of the fracture will be delayed and complete healing with recanalization must await replacement of devitalized bone by creeping substitution.

Phemister [1] in 1930 discussed aseptic necrosis following interference with blood supply in fractures of the head of the femur, the body of the astragalus, the os calcis, and in bone transplants. Cornil and Coudray [6] reported as early as 1904 that in experimental fractures there is necrosis of the cortex for a variable distance from the fragment ends. This zone of necrosis is replaced slowly by bone growing in from the living cortex with which it is continuous, and to some extent from the adjacent callus. The process of healing of a fracture takes place simultaneously with the transformation by creeping substitution of the necrotic bone to new living bone. Leriche and Policard [7] were of the opinion that the calcium used in the formation of callus came for the most part from the aseptic necrotic bone at the ends of the fracture fragments.

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* [illegible] Joint Surgery, [illegible]

† [illegible] Surgeons, Chi- [illegible]

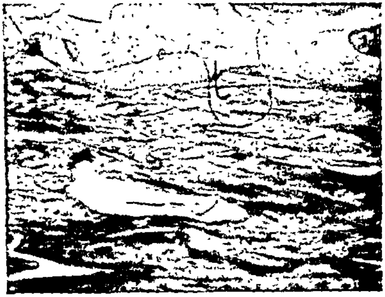

Fig. 1. Photomicrograph of a microscopic section of the end of a full thickness tibial bone graft obtained six months after transplant for fracture of the humerus. The bone cells have disappeared together with their nuclei, indicating death of the graft. X176.

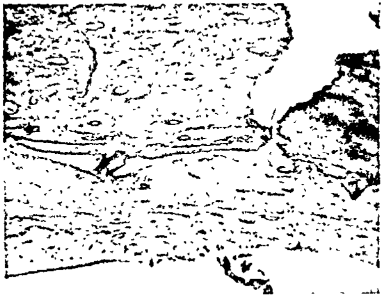

Fig. 2. Photomicrograph of bone obtained from the ends of fracture fragments six months after injury, which resulted in nonunion. The dead bone shown in this section is undergoing absorption and replacement by creeping substitution. X156.

The bone which is necrotic retains a density which is greater than that of the living adjacent bone, and is so recognized in roentgenograms that are made after sufficient time has elapsed to permit atrophy of the bone which has retained a good blood supply. This relative difference in density is produced by the fact that the living bone atrophies following the fracture while the bone which is deprived of its vascularity is unable to atrophy, having no blood supply to take away the opaque mineral salts.

The following case reports demonstrate the typical course of a segmental fracture of a major long bone.

Case 1. M.G., male, aged 43 years, was struck by a passing car while he was changing a tire on April 2, 1946. He was admitted to my service 11 days after the injury. Roentgenograms at that time revealed a comminuted segmental fracture of the upper end of the tibia and a fracture of the fibula. A larger anterior fragment which was separate from the proximal and distal fragments, measured approximately 6 inches in length, and was more than half of the thickness of the shaft of the tibia. The fracture was reduced by open reduction and care was exercised to avoid stripping from any of the major fragments more periosteum than was absolutely necessary in order to obtain accurate position and secure fixation. Roentgenograms which were made 8 months after injury, December 7, 1946, revealed healing of the fracture but the fracture lines have not yet been obliterated, and the major fragments still retain greater density than does the surrounding bone (Fig. 3).

Although this fracture occurred in bone which is largely cancellous and which might reasonably be expected to heal within a few weeks, the actual union was delayed for months because of the disruption of blood vessels to the fragments.

Case 2. J.H., male, aged 40 years, suffered a fracture of the middle third of the right femur on May 31, 1946, when a large slab of concrete fell, striking him on the right thigh. A massive medial fragment of the femur was completely displaced from contact with the proximal and distal portions of the femoral shaft. Although this was replaced at operation without detaching the soft parts, it failed to undergo atrophy, but retained the density which we recognize in the roentgenograms as that of aseptic necrotic bone. This delayed but did not prevent union. Roentgenograms show that satisfactory union for weight bearing has taken place, although a long central zone of the fracture line has not yet bridged across with bone. The major fracture fragment and a portion of the distal end of the proximal femoral shaft fragment retain their density after 10 months (Fig. 4).

Seven months after this injury the patient developed an area of localized swelling in the region of the fracture. On two different occasions this was incised and a considerable amount of serum and necrotic material was expressed. There has been another flare-up of cellulitis since removing the plate. This soft tissue necrosis and abscess formation occurred 7 months after the wound had healed following open reduction. The massive bone necrosis which is still undergoing creeping

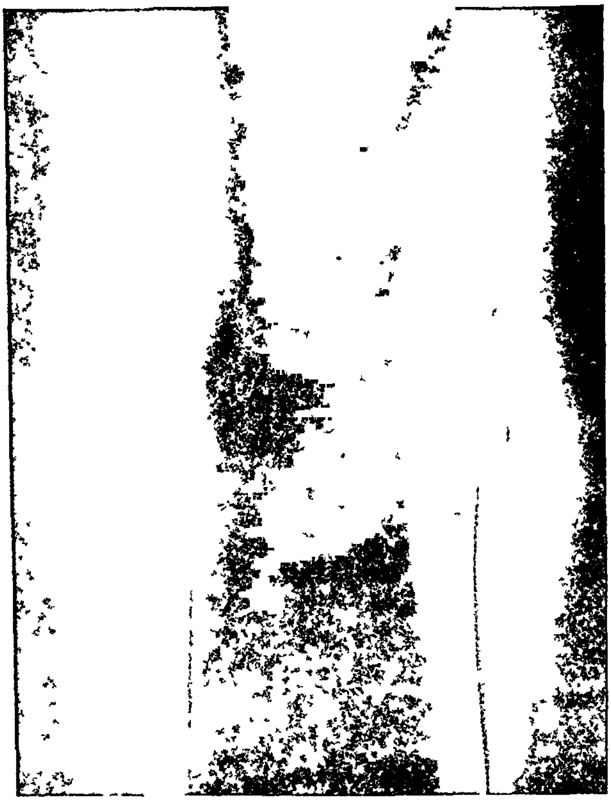

Fig 3 Case 1, M G Aseptic necrosis of varying amounts of bone including a large detached fragment in a comminuted fracture of the proximal third of the tibia, eight months after injury. Fractures are uniting but the fracture fragments still retain greater density than is present in adjacent bones, indicating a deficiency of blood supply and explaining the delay in union after accurate fixation of the fragments

substitution and revascularization may have produced the soft tissue reaction.

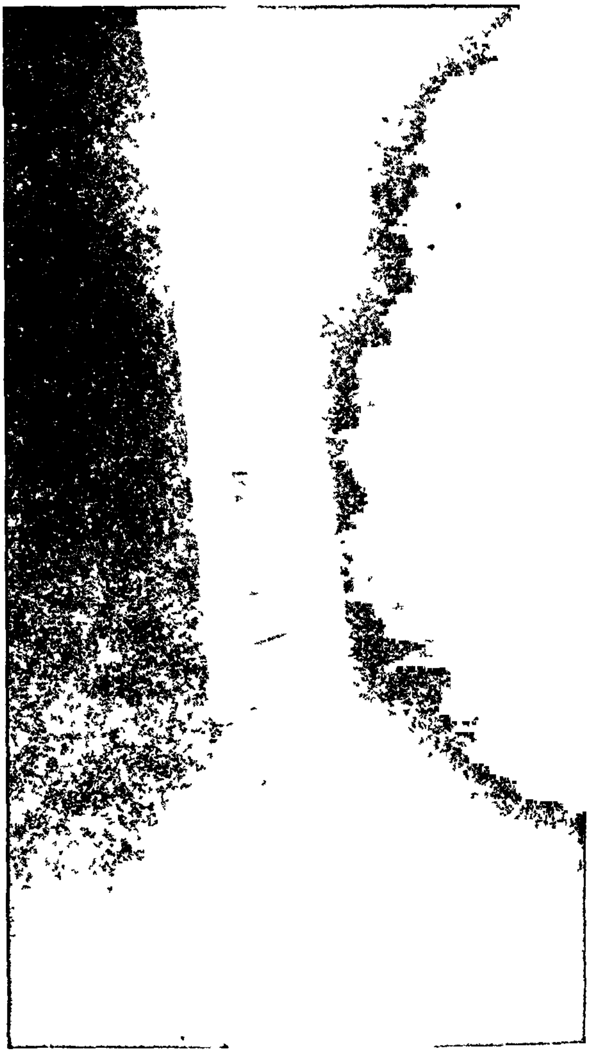

Fig 4 Case 2, J H Roentgenogram made April 9, 1947, approximately 10 months after the fracture. Although the large medial fragment still retains much greater density than the adjacent bone, there has been replacement by creeping substitution along the periphery with union of the fracture Many addition months will be required for complete transformati and vascularization of the bones in this location

this leg were united (Fig 6) These fractu fragments had approximately the same density as that of the tibia below the level of fracture Either because these fragments were small and in contact with vascular soft tissue about them or they had retained enough blood supply by way of nutrient or periosteal blood vessels, they had undergone rapid transformation by creeping substitution to new bone of relatively normal density.

COMMENT

The larger the separate fragment in a segmental fracture in a long bone, the poorer the

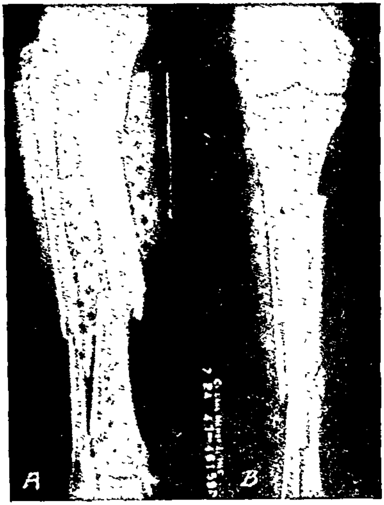

Fig. 5. Case 3, J.L., right tibia. This roentgenogram of the right tibia reveals the extent of the injury to the bones at the time the patient was first admitted to the hospital (A), and the healing that had taken place eight months later (B). The density of the large full thickness segmental fragment in comparison with the bone adjacent to it indicates aseptic necrosis with very little transformation. The fracture is beginning to heal but there is not yet sufficient union to permit weight bearing. Many more months will have to elapse before all of this fragment can be transformed by creeping substitution into living bone tissue.

prognosis from the standpoint of viability of that fragment. In the event that a fragment is partially devitalized and does not retain enough intact blood vessels to maintain a reasonable exchange of arterial and venous blood, aseptic necrosis will occur. Union will then be delayed for many months. With good fixation, however, union will take place long before the large fragment has undergone complete replacement by creeping substitution.

SOMMAIRE

Dans le fracture segmentale d'un des os longs, plus long est le fragment separé, plus mauvais est le pronostic de sa viabilité. Dans les cas où le fragment est absolument dévitalisé et ne renferme pas assez de vaisseaux intacts permettant un échange raisonnable de sang artériel et de sang veineux, la nécrose aseptique survient. L'union est retardée pour plusieurs mois. Mais avec une bonne fixation, l'union s'effectue avant que le grand fragment ait été complétement remplacé par substitution rampante.

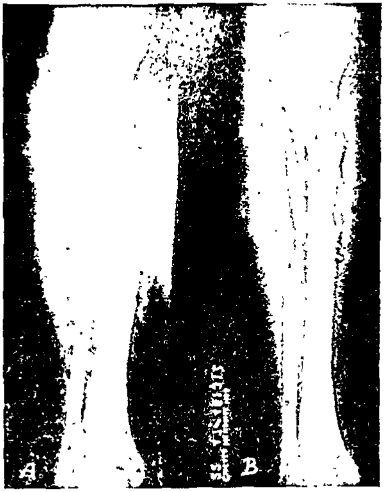

Fig. 6. Case 3, J.L., left tibia. (A) This is also a segmental fracture but the fragments are split up and are not nearly so large as those in the right tibia (Fig. 3). Such fragments have a much better chance of survival, as they require less soft tissue and vascular attachments to maintain enough circulation to preserve viability.

(B) This roentgenogram was made approximately eight months after the injury. Solid bone union has taken place with the exception of one lateral fragment which is uniting, though at a much slower rate. The density of the united fragments is approximately the same as that of the shaft distal to them, indicating that they have had an adequate blood supply or have already been completely transformed by creeping substitution.

SUMARIO

En las fracturas segmentadas de los huesos largos El tamano del fragmento segmentado determina el prognosis de su viabilidad. En general contra mas grande es el fragmento menos es su viabilidad. Cuando el fragmento esta parcialmente devitalizado por razon de

que su circulacion arterial y venosa ha sido comprometida la necrosis aseptica es el resultado. En estos casos la union se retardara por muchos meses. Sin embargo la buena fixacion favorecera la union y esta se obtiene mucho antes de quel fragmento segmentado haya sido reemplazado.

RIASSUNTO

Nelle fratture segmentarie delle ossa lunghe la prognosi diventa tanto piu' riservata, quanto piu' esteso il frammento che viene superato. Una necrosi asettica si stabilisce infatti allorquando il frammento e' parzialmente devitalizzato e non conserva una vascolarizzazione sufficiente per mantenere un adequato scambio di sangue venoso ed arterioso. *In questi casi l'unione dei frammenti puo'* essere ritardata per parecchi mesi. Con una buona fissazione l'unione si stabilisce invece molto prima che il frammento piu' voluminoso sia completamente degenerato.

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Ten Years of Plastic Surgery in a Penal Institution: Preliminary Report

J. F. PICK, M.D., F.I.C.S.
CHICAGO, ILLINOIS

HISTORICAL

THE application of the resources of plastic surgery to criminology is an interesting *departure from the conventional* perspective of surgery.

The application of medical thought in American criminology dates from the year 1821, when the state of Massachusetts appointed a physician to its penitentiary ostensibly for purposes of sanitation. Prior to that time the presence of a physician in a penal institution was not tolerated. A psychiatrist was not officially assigned to a prison until 1905 when the same state appointed Dr. Guy Fernard as physician to the State Reformatory. Yet, to contemplate the application of plastic surgery to inmates of a state penitentiary, even as late as 1937, seemed a strange deviation from common practice.

In that year Dr. Frank Chmelik, Chief Physician to the Illinois State Penitentiary, brought to me the problem of correcting the bodily defects of the inmates of that institution. It was his observation that such defects set the inmate apart from others not only in appearance and usefulness, but in gaining social contact through recreational activities on a par with his fellows.

APPEARANCE AND BEHAVIOR

Personal appearance, in this macabre age of the Machine, Mammon, and Materialism, is pretty generally recognized as an important factor in the gaining of opportunity and the realization of happiness. Contrariwise, defects and deformities of the human body lead to unhappiness and feelings of frustration and inferiority. According to Adler, such feelings actually have their basis in inferior groups. If these organs happen to be exposed to full view and thus make it impossible for the individual to compete with his fellow men on an equal footing, it is not rare for him to become asocial, if not actually antisocial. The association of crime and bodily deformity is not unknown. Examples are legion.

Eligius Weir, O.F.M., for over 20 years the Catholic Chaplain at the Illinois State Penitentiaries, referring in his book "Criminology" to the correction of physical diseases in criminals, avers that "When physical afflictions have been corrected in antisocial cases, the good effects on conduct have been most astounding." He cites one of our inmates at the Illinois State Penitentiary as an example: "There is the case of an individual who has twice come to prison for embezzlement from employers. He is a very intelligent person and a capable office-worker. However, his bodily and facial configurations are such that his personal appearance is not prepossessing and all his life he has been made to feel unwanted. Because he felt lonely and wished to attract people to him—and knowing the drawing power of a good *spender—he committed his crimes so that he* might have funds to be that kind of a person. Much of the money obtained from his defalcations was spent for lavish entertainment but he also spent a substantial sum in an attempt to improve his appearance by plastic surgery."

In this connection I have a personal communication from Dr. Ferris Smith of Michigan who recently operated on the well-known case of a 16-year-old Chicago boy, who threatened the abduction of his employer's children unless a high ransom was paid him. When arrested by federal agents, he bluntly admitted he wanted the money to have his congenitally deformed face altered because all *his life he* was called "monkey face," and excluded by others.

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que su circulacion arterial y venosa ha sido comprometida la necrosis aseptica es el resultado. En estos casos la union se retardara por muchos meses. Sin embargo la buena fixacion favorecera la union y esta se obtiene mucho antes de quel fragmento segmentado haya sido reemplazado.

RIASSUNTO

Nelle fratture segmentarie delle ossa lunghe la prognosi diventa tanto piu' riservata, quanto piu' esteso il frammento che viene superato. Una necrosi asettica si stabilisce infatti allorquando il frammento e' parzialmente devitalizzato e non conserva una vascolarizzazione sufficiente per mantenere un adequato scambio di sangue venoso ed arterioso. In questi casi l'unione dei frammenti puo' essere ritardata per parecchi mesi. Con una buona fissazione l'unione si stabilisce invece molto prima che il frammento piu' voluminoso sia completamente degenerato.

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After describing the boy's facial appearance, Dr. Smith goes on to say, "He was naturally depressed and sour on the world in general." Following the operation, the doctor adds, "He is now a very likeable and happy individual who is keen about his future." And, Dr. Smith concludes, "He is an ideal example of the individual who gets out of touch with Society and may do some criminal thing because of a physical deformity which admits of correction. I am very pleased to have contributed this to his apparently happy future."

CAUSES OF CRIME

The positive causes for crime as laid down by different authors vary not only in word and concept, but in actual premise. They may all, nevertheless, be reduced to three basic theses and that is that crime is essentially hereditary, environmental, or organic.

The organic theory implicates medical consideration. As a matter of fact research and experience over the past 40 years seem to indicate that all three concepts are involved in some degree.

This allows the problem of criminology to be reduced to an interesting hypothetical chain of causal factors which begin with the birth of a biologically fragile quantity, the human being, in whom the mother initiates certain habits and the father heavily influences behavior. The so conditioned child, particularly if beset with a physical defect, then comes into revealing conflict with his associates and environment. This sets up stresses to which the child must adjust to survive. At every turn he must choose between family precepts, the world and self. No matter the choice, it all requires a psychosomatic threshold whose absence may make any choice seem ultimately the wrong one. Notwithstanding, the conditioned mind and irreversible somatic habitus become objects of lifetime appraisal by others and subjects of true concern to the bearer. The appraisal of society is variable and problematical, but the psychologic trauma remains inescapable.

The item of greatest import to the plastic surgeon, in this manifold causative order of things, is the relationship of physical deviations and appearance to behavior and finally crime.

PATHOGNOMIA CRIMINALIS

In passing we must take note of the frequently quoted hypothesis of the criminal anthropologic type, which was popularized by Cesare Lombroso, the Italian criminologist. He contended that certain physical deviations from the norm, such as Darwin's tubercle, were pathognomonic of the criminal type. If this were true, ablation of such deviations by plastic surgery would not aid in the treatment of criminality, but merely suppress identity.

Some disciples of Lombroso even venture that the criminal type can be recognized by certain arrangements of the palmar creases. I have seen this demonstrated in one case, where the prediction came true and the individual was later electrocuted for murder. One case of course proves nothing.

Apropos of Lombroso's anthropologic stigmata of criminality, Dr. Bunta of Chicago, formerly of Loyola University, identifies the criminal as an "atypical genius" in company with the "'mute, inglorious Miltons'; the muddle-heads; the prodigies and idiot savants." The primary difference between true genius and the criminal type, he avers, rests on altruistic creative grounds in the former as against selfish considerations in the latter.

From my experience, the subject of somatic criminal stigmata may be rested with the statement that thus far there is no reliable scientific evidence that a distinct "criminal type" is identifiable by specific signs or symptoms. The implications of blind acceptance of such a hypothesis would not only have strange effects upon our moral concepts of good and bad, but also upon treatment of crime.

TREATMENT OF CRIME

The history of the treatment of crime has had its innings, from the exclusive age of cure by punishment, to psychiatric analysis which has thus far yielded a mass of interesting statistics. This led to the modern era of the individual treatment of the criminal based upon the realization that the criminal remains an individual who is in some way a handicapped person.

A physical handicap in a young person who in other ways finds it a struggle to understand the social scheme of things may prove to be the trigger of a psychosomatic conflict which in one individual may lead to a gastric ulcer and in another to crime.

THE PROJECT

With the enthusiastic cooperation of the then and now Chief Warden of the State

Penitentiary, the Honorable Joseph E. Ragen, plus the fine surgical facilities available at the institution, several cases of particular interest formed the seed of a work begun a decade ago and which is still in progress.

The project began in 1937 at the so-called old State Penitentiary in Joliet, Illinois, around a nucleus consisting of six patients. All of these cases had repeatedly been in trouble with the law and remained "problem children" in the penitentiary. The first was a young man born with ears pinned on to his head by nature in what appeared to be an upsidedown position. The second was an inmate who early in life suffered a gross deformity of the foot with loss of a heel, in consequence of which he limped badly and found it difficult to hold any job. The third was one who seemingly got along well until he had lost his nose. The fourth was an individual born with webbed hands and feet. The fifth was an inmate covered from head to foot with hundreds of painful tumors of the neurolipoma type. And the sixth, though conscious of a peculiar looking face, claimed he never had any urge to commit a crime until one day his young son, seven years of age, began to shy away and remark, "Daddy, you look just like a bad man, why don't you change your face."

With the passing of time, all types of male criminals, men of all ages from all walks of life and particularly those where the sociologist, chief physician, psychiatrist, chaplain, or the warden, felt that there was reason to believe some connection may exist between the bodily defect and the individual's behavior, were accepted for surgery. In due course of time, a surprising number of requests were being received, and still are, from family and friends of the inmates for the correction of their physical aberrations, with the affirmation that it will help the individual to face society with greater equanimity.

ACCEPTANCE PROCEDURE

Applications for corrective surgery are made through the Chief Physician, Sociologist, Psychiatrist or the Warden. The individual is then admitted to "sick line" for examination If he looks like a potential candidate, he is referred to the plastic surgeon and listed for evaluation. If acceptable, he is admitted to the hospital for general checkup and indicated laboratory work including x-rays and photographs of the defect by the Bureau of Identification. Upon admission for plastic surgery he is given preoperative care in accordance with recognized surgical practice. Only acceptable surgical procedures are employed. Technical aid in the operating room is furnished by excellently trained inmate personnel. The patient remains in the hospital after operation as long as necessary for adequate postoperative care. Complete permanent records are kept of the entire process and the surgical procedures employed. With the conclusion of the surgical treatment, the inmate is rephotographed by the Bureau of Identification in charge of Mr. Frank Petty.

An interesting sidelight in this work has been the remodelling of gross or vulgar features in a small group of men labeled as probably confirmed antisocials. They are men in whom the doing of wrong seems to have become a habit or second nature as it were. Many of these have left the prison and have been doing well, but a few are in doubt. They are individuals who since their improvement in appearance have given up ordinary forms of crime such as thievery and risen to higher and more subtle antisocial efforts. They are few indeed.

REASONS WHY INMATES SEEK SURGERY

Although the majority of requests for surgery come from inmates afflicted with obvious congenital or acquired defects, 15 per cent are for purely cosmetic reasons according to our present objective premises as to what constitutes a defect. These include hump-noses, duckbill noses, unusually prominent noses, lop ears, pockmarks, prominent lips, etc.

The reasons usually given for seeking surgical corrections are:

1. The desire for improvement of function.
2. To get rid of a congenital defect which has been a life-long embarrassment.
3. To correct acquired defects so as to better accomplish prison responsibilities.
4. Because this is the first chance the individual has had to look like other people.

5. To be eligible for a better job in the prison.
6. To be more presentable on release.

When the above reasons are compared with the nature of the complaint, this gives interesting insight into personality types of importance to the psychiatrist and the sociologist.

TYPES OF DEFECTS

The defects and deformities encountered between the years 1937 and 1947 among 14,467 admissions are listed in the accompanying table.

Location	Congenital	Acquired	No. of Operations
Ears	27	19	73
Eyelids	3	9	14
Nose	49	109	207
Face	4	31	43
Mouth, lips, etc.	5	14	21
Neck	4	11	16
Jaws, palate, etc	6	4	14
Chest, breasts	2	3	7
Abdomen (minus hernias)	1	2	3
Genitalia	3	2	7
Skin (minus common tumors)	11	189	202
Upper extremity	7	12	27
Lower extremity	9	17	29
Total defects	131	425	663
Grand total	556		
Number of patients	376		

RESULTS OF PROJECT

The *surgical results* of the project have been in every way as forthcoming and adequate as one would expect in any modern hospital. This has been due primarily to four reasons:

The training, zeal and devotion of the inmate operating room and hospital help.

The operating room and hospital facilities.

The cooperaton of the resident staff and sociologist, and

The high discipline and morale of the patients.

There have been no fatalities or deaths on the plastic service in the 10-year period.

There have been no major complications, which is a credit to the inmate nursing staff.

The *psychologic results* have been the most outstanding feature and gain, particularly as concerns improvement in general behavior of the inmates long after operation. Also in the salutary influence this new interest has had on the other inmates in the institution. Finally, there has been a gratifying response from the families of the patients which completes a circle of factors, all having a bearing on the behavior of the individual during incarceration.

The *sociologic results* cannot for the present be stated in full except to say that only 1.07 per cent of the 376 patients operated upon have been returned to the institution in 10 years. This is markedly below the usual percentage. The ultimate sociologic evaluation of the project must await certain official statistics and developments in the future.

ATTITUDE OF THE INMATES TOWARD THE PROJECT

The general attitude of the inmates toward this project can best be expressed by stating that the standing list of applicants for correction of bodily deformities at no time in the 10-year period numbered less than 50 and at the present time constantly numbers well over 100. It can be further expressed in the words of one of the operating room aids who one day remarked, "Doctor, if you should ever stop doing this work for the boys, there will be a lot of heartbroken kids in this big house." In general, the plea is that this is the first and only opportunity the inmate has had for correction of his deformity, because, "The family did not know what to do or did not care," or that "no one was interested anywhere." The most zealous individuals are those who are about to leave the institution and "would like to get rid of all reminders of their former life," particularly when afflicted with scarred faces and what is known as "a tough looking mug."

OFFICIAL ATTITUDES

An inspiring commentary was that of Father Weir, the former Catholic Chaplain of the Illinois State Penitentiary, who in referring to this project in his book, "Criminology,' published in 1941 by the Institute for the Scientific Study of Crime (publication allowed by Cardinal Stritch of Chicago) concludes by saying, "Recently the resident psychologist of a large penitentiary, basing his plea on the psychological significance of physical handicaps to crime, convinced the prison administration and medical staff that it might be a worthwhile experiment to allow a plastic surgeon to make over the configurations of some of the institution's most offensive appearing prisoners. The experiment has been partially carried out: a few ugly faces have been remodeled, blemishes covered, etc In addition, prison surgeons have straightened a few legs and arms and removed unsightly growths. Today there is something new about the men treated which is not physical; a new light in the eye, a new step, shoulder a little squarer, and head held a little higher The value of the experiment will be known only after a study of their social readjustment following release." Possibly the best commentary is that of the Chief Warden, Joseph E. Ragen, an outstanding penologist, "This work has done amazing things for our men in their behavior during incarceration and I wouldn't be at all surprised if it helped them a great deal on the outside."

CONCLUSIONS

The following conclusions seem warranted after a 10-year period of plastice surgery on inmates of a state penal institution:

1. A physical defect or deformity, though usually only a contributing factor, can be a dominant cause of crime.

2. The correction of bodily defects in adult inmates of a penal institution strikingly influences their conduct during incarceration. This is in accord with the principles of modern mental hygiene.

3. The removal of such defects makes the individual more confident of his reentry into society.

4. The physical rehabilitation of an inmate not only establishes a psychologic benefit to his person, but has a salutary influence upon his associates and his family.

5. Where criminality has become an established habit, in all other ways resistant to rehabilitation, improvement in the appearance of an adult incorrigible may change the standards of his criminal practices upon release from that of a common thief to that of a specialist of a higher order. It is therefore felt that where bodily defects or gross features, exist in the youthful delinquent, who all his young life is referred to as "monkey face," "one-eared Dago," "fish face," "dog ears," or "limpy," such defects be corrected and their trigger value removed before the boy delinquent becomes the man criminal.

SUMMARY

The origin, nature and plan of the application of the resources of plastic surgery to criminology have been outlined. The work accomplished at the Illinois State Penitentiary on 376 men, numbering 663 operations between the years 1937 and 1947 have been noted. Certain preliminary conclusions have been drawn to the effect that: (1) Although physical aberrations usually are only a contributing factor to crime, in certain cases they may be the dominant cause; (2) the physical rehabilitation of an inmate not only establishes a psychologic benefit to his person, but has a salutary influence with his associates and his family; (3) where bodily defects or gross features exist in the youthful delinquent, who all his young life is referred to as "monkey face," "one-eared Dago," "fish face," "dog ears" or "limpy," it is advisable that such defects be corrected and their trigger value removed before the boy delinquent becomes the man criminal.

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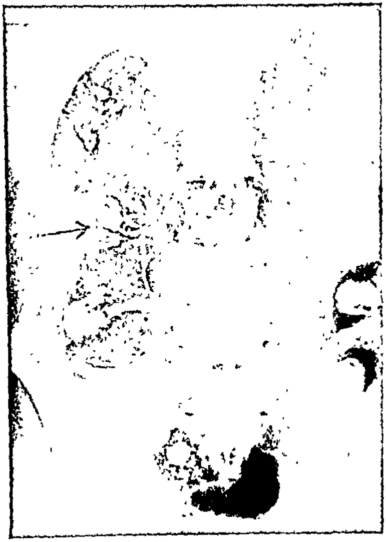

Fig. 1. Medial displacement of ascending colon, June 20, 1947.

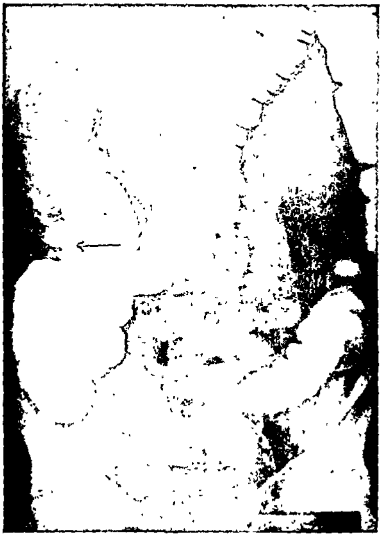

Fig. 2. Air contrast showing displacement or defect, ascending colon, Oct. 20, 1947.

Examination other than abdominal did not contribute to the diagnosis. The abdomen was flat. There was a well-healed right subcostal oblique scar, nontender. The liver, spleen and kidneys were not felt. No herniae were found. On deep palpation, laterally, in the right upper quadrant of the abdomen a large, slightly tender, fixed mass was felt. It did not move with respiration. Rectal examination was negative. The urine was negative, the red cell count was 4,600,000, white cell count was 15,000 with 87 per cent polymorphonuclear leukocytes, 12 per cent lymphocytes, 0.5 per cent eosinophiles and juvenile forms. The sedimentation rate was 34 mm. and the hematocrit reading 48 mm. The diagnosis of an appendiceal granuloma was made, and he was told to come in for further study. Two days later the excretory urogram was reported to be normal, and examination of the colon with barium enema was stated to show "what is apparently a large, indurated ulcer involving the lateral aspect of the ascending colon at a point just proximal to the hepatic flexure. The entire ascending colon at this point is displaced medially, but filled and emptied normally. There was no local tenderness over the mass felt in this region, although there was some limitation of mobility in this region." The radiologists interpreted the findings, in view of the presence of blood in two stools, as being due to a malignant tumor of the ascending colon (Fig. 2).

He entered the Oak Park Hospital Nov. 1, 1947, after he had taken 10 Gm. of phthalylsulfathiazole daily for five days. The mass was demonstrably smaller, and he had gained five pounds in weight. His blood pressure was 136/84, the temperature was 98.6, sedimentation rate 19 mm., cephalin flocculation 1 plus, total proteins 7.07 Gm. 100 cc. of blood; albumin/globulin ratio was 1.53 1. The red cell count was 4,600,000, hemoglobin 13 Gm., white cell count 4,600 with 62 per cent polymorphonuclears, 35 per cent lymphocytes and 3 eosinophiles. The urine had a specific gravity of 1.020, and showed no other abnormality except an occasional granular cast. The preoperative diagnosis was appendiceal granuloma, but it was impossible to exclude the possibility of carcinoma of the ascending colon.

Operation. Operation through a long right rectus incision was performed under cyclopropane anesthesia on November 6. The cecum appeared

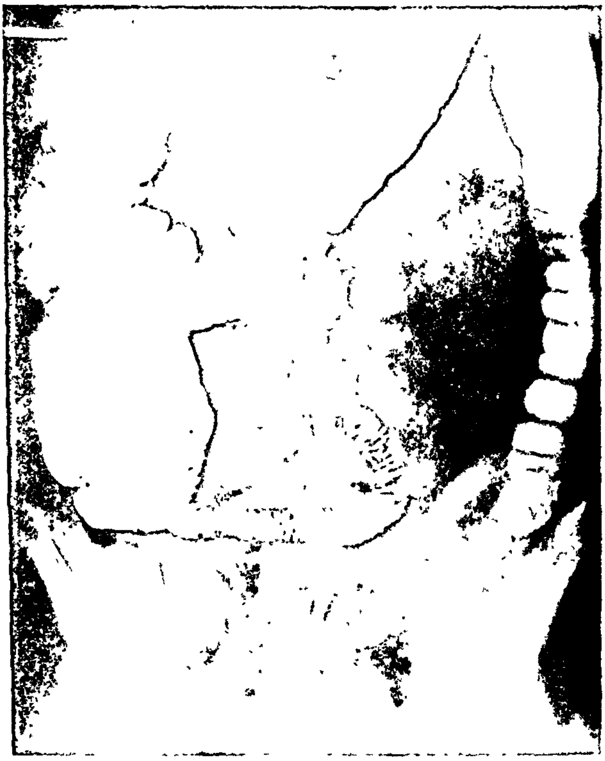

Fig. 3. Postoperative appearance, barium enema.

normal, as did most of the ascending colon. There was a considerable amount of thickening in the region of the hepatic flexure, with fixation of the mass to the posterior abdominal wall; there were no changes within the peritoneal cavity. The cecum and ascending colon were mobilized by dividing the lateral peritoneal attachment, rotated medially, and the appendix exposed. The latter was long and thick, entirely retroperitoneal and retrocecal. At a point just below the hepatic flexure both appendix and colon were involved in a granulomatous mass approximately 5 cm. in diameter. The appendix was divided at the base, the stump closed by inversion without ligation, and the distal end separated from the colon by blunt dissection. The lateral leaf of peritoneum was tacked over the raw area on the colon with several interrupted silk sutures, and the abdomen closed without drainage. Bank blood (500 cc.) was administered during the operation. The postoperative course was completely uneventful. The patient was up and about from the afternoon of the first postoperative day onward. A second pint of blood was on hand, and this was given, although the need was not obvious. He left the hospital one week after operation, and returned to his work a week after that. He felt well, completely relieved of all preoperative complaints until Dec. 28, 1947, when he became ill with a painless jaundice, mild fever, anorexia and slight diarrhea. Recovery from this apparent homologous serum jaundice was rapid, with no fever after Jan. 1, 1948, and stools back to normal by Jan. 20, 1948.

The lumen of the removed appendix was open at the base, and at the point where it entered the granuloma; section taken at this level showed only tissue characteristic of chronic nonspecific granuloma. The appearance of the colon after barium enema Dec. 18, 1947, is shown in Figure 3.

SUMMARY

1. A case history is reviewed in which an appendiculocolic granuloma is presumed to have been due to intracolic rupture of an appendiceal abscess.

2. Colon x-ray findings in such cases may be easily misinterpreted unless careful consideration is given to the history.

3. Appendectomy is curative.

4. Homologous serum jaundice may occur even with blood from banks which take a "jaundice history."

SOMMAIRE

L'auteur rapporte un cas de granulome appendiculocolique dû apparamment á la rupture d'un abcès appendiculaire. Dans les cas analogues, la radiographie du colon se prête à de fausses interprétations si on ne condère pas attentivement les détails de l'histoire donnée par le malade. L'appendectomie est curative. La jaunisse de sérum homologue peut survenir après la transfusion de sang provenant de dépots qui prennent un examen meticuleux du sang afin d'exclure cet accident.

SUMARIO

El autor presente la historia detallada de un caso de granuloma colico-apendicular cuyo origen se presume el ser la ruptura intracolica de un abceso apendicular. La radiografia del colon en estos casos puede facilmente mal interpretarse si no se toma una historia detallada. La apendectomia en estos casos es curativa.

RIASSUNTO

Riporta un caso di granuloma appendicolocolico che ritiene dovuto alla rottura intracolica di un ascesso appendicolare. In casi del genere i risultati dell'indagine radiologica possono condurre ad errori di interpretazione, se non integrati da un accurato controllo anamnestico e clinico.

La cura consiste nell'appendectomia

Intussusception of Ascending Colon

FRANZ K. FLEISCHLI, M.D., A.I.C.S.
SPRINGFIELD, ILLINOIS

INTUSSUSCEPTION or the telescoping of one portion of the intestine into a more distal segment is not a common condition. This is most frequently found in children under two years of age, usually between the fourth and ninth month, approximately one-half of these cases falling in this age group. The small bowel is much more frequently involved than the large bowel. The etiologic factor is still somewhat obscure in the majority of cases, but in about 5 per cent there is demonstrable some mechanical abnormality, such as Meckel's diverticulum or an intestinal polyp.

According to Alvarez's[1] metabolic gradient theory, the fundamental factor which determines the polarity of intestinal peristalsis is the metabolic activity of the intestinal muscle. The normal metabolic rate progressively diminishes distally from the duodenum along the intestinal tract to the rectum. Thus in the presence of inflammation in one portion of the intestinal tract, the metabolic rate of this portion increases and when it exceeds that of a more proximal portion, it becomes the center of polarity. Keeping this in mind, any inflammatory process may cause a powerful localized spasm resulting in constriction adjacent to or at the site of the irritation. The peristaltic waves approach this constricted segment and, being unable to pass, set the stage for the bowel to be invaginated. The waves increase in severity until a more powerful wave finally carries a small constricted segment into the relaxed distal segment.

Thorek and Lorimer[2] have shown that antiperistalsis can be as efficient in ridding the intestine of its contents as normal peristalsis and, like the normal, its force increases progressively as long as the etiologic factor is present or until the intestine becomes exhausted. Antiperistalsis occurs in all portions of the gastrointestinal tract. It occurs in the normal process of digestion in the duodenum below the cap and also for a variable distance above the ileocecal valve to check the rapid passage of ileal contents into the cecum. With this in mind, retrograde intussusception may be appreciated.

The clinical picture of intussusception may be quite clear. There is the usual sudden onset of severe pain followed by vomiting with repeated paroxysms of colicky pain and repeated vomiting. Bloody stools usually follow, with a palpable tumor mass present in the abdomen associated with shock.

CASE REPORT

On Jan. 14, 1948, a 14-year-old white boy was admitted to St. John's Hospital with the history of having been perfectly well until about five hours before. At that time he ate breakfast and enjoyed it. About an hour or so after eating he had a severe cramp in his abdomen which was quickly followed by severe vomiting, the vomitus consisting of previously eaten food. Following the vomiting, he had loose watery stools. About 1:00 P.M. he was seen by a physician who withheld everything by mouth and prescribed some sulfasuxidine tablets. The vomiting and diarrhea stopped, but the pain persisted and he was hospitalized. The morning after the onset he still had severe cramps and vomiting. This time there was a palpable mass in the right lower quadrant. A diagnosis of intussusception or volvulus was made and the patient was taken to surgery.

Under sodium pentothal anesthesia supplemented by intratracheal cyclopropane a right lower rectus incision was made and the abdominal cavity opened from which a quart or more of straw-colored fluid was aspirated. The cecum and ascending colon were identified and intussusception involving the ascending colon diagnosed. The bowel was markedly swollen and almost black in color. The ascending colon and cecum were resected and an anastomosis made between the end of the ileum into the side of the stump of the ascending colon. The wound was closed in anatomic layers.

The patient was out of bed on the fourth postoperative day and made an uneventful recovery.

Report on the pathology by Dr. Harry M. Steen, pathologist of St. John's Hospital, was as follows:

Gross Examination. Specimen consists of resected ascending colon measuring 30 cm. in length.

There is an intussusception of the proximal portion of the colon. The bowel wall is infiltrated with extravasated blood. The lumen of the gut is filled with hemorrhagic fluid. The appendix is present and grossly appears normal. The ileocecal valve is grossly normal.

Microscopic Examination. Sections of the colon show the wall to be infiltrated with extravasated blood. The mucosa shows ulceration.

Diagnosis. Intussusception of the colon.

The treatment for intussusception is immediate surgery although at times the infantile type may be reduced spontaneously. Nevertheless, there is always a lingering doubt whether reduction has been complete and recurrences are common. Tragedy often results from indecision and procrastination.

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Sección en Español

Estado Actual del Tratamiento de las Várices I Sus Complicaciones

C. A. PROTZEL AND PEDRO ICOCHEA
LIMA, PERU

LAS várices o flebectasias según la definición de Alibert i Briquet, son las dilataciones permanentes de las venas resultado de las alteraciones de sus paredes.

No vamos a tratar aquí de su compleja etiología, pero señalaremos sí, la tendencia varicosa familiar según Ochsner i Magnus; alteraciones del metabolismo, transtornos neuro-vasculares i factores endógenos de orden hormonal que intervienen, junto con la inflamación de las paredes venosas i el factor mecánico, en la producción de las várices

La referencia que hagamos va dirigida a las várices del *miembro inferior, susceptibles* del tratamiento quirúrgico de acuerdo con la experiencia tenida en el Servicio de Cirugía del I-A-E del Hospital Obrero de Lima, cuyo Jefe el Dr. C. A. Protzel en compañía del Dr. Fco. Graña (Jefe del Departamento Quirúrgico) i los Asistentes del Servicio, han laborado durante cuatro años.

La terapéutica de los estados varicosos ha interesado desde antiguo a los médicos i cirujanos. A través de reseñas históricas, captamos por ejemplo que Hipócrates empleaba la compresión como medio paliativo i del cual la media elástica es su representante; como Plutarco refiere que a Mario se le extirpó una vena varicosa no tolerando se le tratara la otra pierna por el exceso de dolor. También se nos refiere que en épocas posteriores hasta llegar a la Era Listeriana se empleaban procedimientos médicos i quirúrgicos algunos de los últimos con resultados sépticos deplorables; así por ejemplo la ligadura mediata de vena i piel de Chaumette (1627) i Ganey (1716); la ligadura simple a cielo abierto de Hame (1797) la sección simple transversal a cielo abierto por Brodie (1816) i después Velpeau; la ligadura mediata sobre cuerpo extraño (alfiler) por Davat en 1833; la sección subcutánea de las venas con tijeras empleada por Lisfranc en 1847.

Con la aparición de la jeringa de Pravaz (1850) i el tratamiento de los aneurismas arteriales por las sales férricas, mas tarde, Valette, Petrequin, Desgranges i otros, emplearon para las várices el percloruro de fierro; Negretti empleó el cloral; Tavel, la solución fenicada al 5%, etc., procedimientos que fueron abandonados a causa de la infección *i embolias mortales* que se produjeron. Mas tarde Sicard i su escuela a raíz de la observación de fleboesclerosis por las inyecciones de arsenicales, mercurio, etc., sin consecuencias letales, empleando el carbonato de sodio hicieron resurgir este método para las várices. Por ello, se ha empleado después el clorhidrato básico de quinina por Berard de la escuela de Lyon; la quinina-uretano, el cloruro de sodio hipertónico, salicilato de sodio, dextrosa hipertónica, oleato de potasio i morruatos por las anglo-sajones (Rogers).

Los métodos operatorios propiamente surgen con la operación de Trendelenburg en 1891 con la ligadura i sección de la safena; con las de Perthes (ligadura en tres pisos); Lebderhose (ligaduras múltiples); los de Schwartz (resección escalonada); los de Ricard, Madelung, Terrier i Alglave (resección total de la safena); los de Moreschi (incisiones circulares i semejantes de Rindfleisch, Friedel, etc., con un 60% de recidivas i 20% de mejoría. Otras técnicas, como las de Babcock, Mayo, Vaquiez, Bopp, tenían un 40%

de beneficio. Por último, como valor histórico señalaremos la operació de P. Delbet (anastomosis safeno-femoral) difícil i peligrosa.

Los métodos combinados: operación e inyección de sustancias esclerosansurgen desde 1903 con la técnica de Schiassi i su solución yodo-yodurada (yodo metaloide 1 gr., yoduro de potasio 1.60 gr., agua destilada 100 cc.); después Takats con la esclerosis tardía por el oleato de potasio al 5–10%; Pratts (solución quinina-uretano), Stanton-Sherman, Ochsner-Mahorner, que son actualmente los métodos de elección puesto que el método esclerosante tiene una mortalidad despreciable de 0.013% según McPheeters i Rice en 53 mil casos o sin mortalidad en los 20 mil de Kilbourne. Esto dicho, unido a la asepsia i antisepsia con un método quirúrgico bien reglado que cumpla, en los estados varicosos, *con los fines de la intervención quirúrgica*, cuales son:

1° obliterar las venas varicosas
2° ligar o extirpar i
3° modificar las condiciones fisiopatológicas creadas por la insuficiencia valvular, hacen actualmente a estos métodos, los de elección.

Refiriéndonos a estos métodos actuales para el tratamiento de los várices i sus complicaciones, es importante anotar que incluídos en *el preoperatorio,* juega importante papel el estudio de las pruebas de suficiencia venosa superficial, suficiencia profunda i de las comunicantes, empleando los test bien conocidos por la sapiencia vuestra como son los de Trendelenberg i sus variantes (entre ellas la de la escuela argentina de Finochicto), la maniobra de Perthes, la prueba de Pratts o la de Mahorner-Ochsner, para tener al menos, una base de intervención puesto que muchos de los fracasos, con recidivas por consiguiente, se debe a la nueva repleción venosa por retorno de la sangre ya sea a favor de las comunicantes o de las colaterales. Por ello debe pues localizarse el lugar de la insuficiencia venosa.

Hoi día además, Lesser i Danelius de Walla-Walla, Washington, emplean *un método flebográfico,* que nosotros hemos empleado también, para indicar en la película las comunicantes insuficientes, muchas de las cuales han pasado desapercibidas con los test antedichos. Su técnica consiste, en: coger la vena por detrás del maleolo interno o en el dorso del pié disecándola si es posible con anticipación i colocándo en ella una cánula para que no salga hasta inyectar el medio de contraste en la sala de rayos X; inyectar Diodrast o Nosylan al 35% (Acido N-acético 3–5 bi-yodo piridina-dietanolamina) primero 1 cc. esperando 15 segundos para contemplar alguna intolerancia; luego introducir los 29 cc. restantes en 45 segundos. Tomar tres placas radiográficas escalonadas que se han colocado contiguas a la pierna muslo i parte de pelvis, tan pronto se ha concluído de inyectar el Nosylan. Desarrollar las placas.

Si no se empleara este poderoso medio auxiliar, es conveniente ya en el mismo acto operatorio, tener presente que existe un vaso constante como es la *vena perforante media del conducto de Hunter* según los estudios anatomo-quirúrgicos de Stanton-Sherman de San Francisco de California, la cual vena comunica la circulación superficial con la profunda a nivel mas o menos de la unión del tercio superior con el tercio medio del muslo. Igualmente, aunque no es constante, existe otra vena mas inferior que pone en relación el plexo geniculado interno de la rodilla con la vena sub-sartoria i va a desembocar en la femoral encima del anillo de tercer aductor.

Nosotros creemos que una de las causas de las recidivas que se ha tenido en el Servicio a pesar de emplear las técnicas de Moreschi, Terrier i Alglave, Mayo, Schwartz, Pratts, Ochsner, etc., se debe a la falta de consideración de las comunicantes descritas i su consiguiente ligadura.

Actualmente nuestros enfermos varicosos se tratan de acuerdo con el diagnóstica del *grado de las várices* i sus complicaciones, teniendo en cuenta *la circulación* profunda i estado de las comunicantes, asi como para el empleo de las *sustancias esclerosantes*, la consideración de las contra-indicaciones i posible estado de sensibilización. (Mahorner-Ochsner observan con los morruatos un 3% de reacciones alérgicas de la piel i además en algunos casis hai colapso vascular severo con vaso-espasmo de la extremidad.)

Los casos de várices de segundo grado, no mui extensas, lineales o poco tortuosas, sin muchas colaterales, las tratamos con inyecciones esclerosantes de morruato de sodio al 5% en dosis ascendentes semanales a partir de 0.5 cc. o 1 cc. hasta llegar a 6 u 8 cc.

Hemos pasado por el tratamiento esclerosante teniendo en cuenta la escasa o ninguna mortalidad, asi como considerando las contra-indicaciones. De la primera ya nos hemos referido a McPheeters (0.013%), Kilbourne (0%), agregando aquí Hayes de Minnesota en 30 mil inyecciones no ha observado casos fatales. Entre nosotros tampoco, por felicidad se han presentado, recidivando sí como ha sucedido con otros autores. De las segundas, o sean de *las contra-indicaciones* de las sustancias esclerosantes inyectables recordamos la edad avanzada, los cardio-renales, el embarazo, la flebitis profundas ya habidas o un estado *infessioso actual*.

Las várices de tercer grado, avanzadas, lo mismo que aquellas complicadas con úlceras simples o recidivadas, eczemas pertinaces o con transtornos de los tejidos vecinos: nervioso, muscular u óseo, etc., las hemos tratado con la técnica quirúrgico-esclerosante (efectuamos pruebas funcionales venosas o la flebográfica, ligando las comunicantes bajas), en las soluciones de continuidad, previamente preparadas, aplicamos injertos de Corachan o los de Thiersch; también movilización de planos profundos por pensar nuestro Jefe del Servicio que con las adherencias i la tensión de los tejidos con la marcha(se producen micro-hemorragias que favorecen la recidiva de las úlceras. A veces en el post-operatorio agregamos para las venas varicosas superficiales algunas sesiones de morruato.

La última técnica quirúrgica-esclerosante aludida líneas atrós, la realizamos en los tiempos siguientes:

1° Anestesia: raquídea o local.

2° Incisión A, para la ligadura alta i sección de la safena i los afluentes que desembocan en el cayado.

3° Inyección retrógrada estrictamente venoca por el cabo distal safeno de 5 cc. de solución de sodio al 5%.

4° Incisión B, inferior del muslo para la ligadura i sección de las venas comunicantes profundas que van al conducto de Hunter.

5° Cierre de las heridas previa correcta hemostasia.

6° Si existe úlcera, aplicación de injertos de Corachan o Thiersch, de inmediato o en otra sesión quirúrgica.

Las operaciones practicadas en el Servicio durante cuatro años, sobre un total de *cerca de doscientos enfermos*, han sido de las mas diversas.

Los datos estadísticos que a continuación expresamos se refieren a ciento cincuenta historias clínicas que han sido revisadas cuidadosamente, excluyendo el resto por no encontrarse datos concretos. Para facilidad de la exposición en el cuadro adjunto se exponen en síntesis lo que vaños a expresar:

1. *La Edad* de nuestros pacientes ha sido tomada a partir de los 14 que es la mínima para los efectos del Seguro, hasta mas de 50 (La edad máxima en el Seguro se considera con los 60 años).

Encontramos que entre los 14 i los 20 solo hai un paciente, o sea 0.66%; (b) entre los 21 i 30 se consignan 51 o sea el 34%; (c) entre 31 i 40.36 enfermos o sea el 24%; (d) entre los 41 i 50.36 enfermos o sea el mismo 24% i (e) 26 varicosos en pacientes de mas de 50 años o sea un 17.3%. Luego, el mayor porcentaje de enfermos varicosos, se presenta en los asegurados entre los 21 i 30 años o sea en la tercera década de la vida. Curtius encuentra que los varicosos son mas numerosos cuanto mas edad tienen, v.g.: 1.01% entre 15 i 25 años en comparación de 24% en los pacientes con mas de 40 años de edad.

2. En cuanto al *Sexo*, hemos tratado con 134 varones o sea un 89.33% i solamente con 16 mujeres que son 10.67%. Por lo tanto, no podemos relacionar lo concerniente al sexo i estudio de las várices por la gran diferencia de número con que hemos actuado.

3. *El Tiempo de Enfermedad*, lo hemos tomado entre los dos meses i mas de 30 años anotándose 25 pacientes en los cuales no se ha podido determinar dicho tiempo.

Podemos decir que nuestro mayor porcentaje (37.33%) de enfermos se presenta para ser operados con un tiempo de evolución de sus várices entre los primeros 5 años.

4. En lo que se refiere a la *Raza* de nuestros

pacientes, hemos tratado en su mayor parte el mestizaje que predomina en la gran masa de asegurados (94%). Las otras, blanca, negra o amarilla constituyen escaso número.

5. Tenemos en *la Incidencia Segun la Pierna Afectada*, hemos encontrado un porcentaje de 40% para la pierna izquierda con un 7% más sobre su opuesta. En este predominio de las várices en la pierna izquierda, coincidimos con la mayoría de los investigadores, no así con Ochsner i Mahorner, para quienes no hai predilección.

6. *La Incidencia Segun el Sistema:* Entre Nosotros, las várices del sistema safeno interno unilateral ha sido de predominio saltante (70.66%) sobre los otros sistemas, conforme puede verse en el cuadro.

7. *Las Várices Complicadas*, han predominados entre los asegurados en cuánto a las úlceras se refiere, pues tenemos que les ha correspondido un 53.3% de los casos, con una insignificancia de otras complicaciones.

8. *Las Reacciones Serologicas* de Wassermann i Kahn han sido positivas solo en 12%, siendo las de Mazzini igualmente positivas en 4.66%. Luego, en la mayoría de nuestros pacientes hemos operado con sero-negatividad (80%).

9. En lo referente a las *Tecnicas Operatorias Empleadas* i su resultado en nuestros ciento cincuenta pacientes estudiados, tenemos lo siguiente: (1) Con *la safenectomía* en los varicosos operados por nosotros, ha existido un 80% de recidivas, cifra elevada por lo tanto: del resto no tenemos noticias exactas como para poder comentarlas. (2) Con la *ligadura alta de la safena i las colaterales* que abocan al cayado hemos encontrado un 20.83% de recidivas, lo que ya significa un buen éxito operatorio. (3) Con *la misma técnica*, pero *agregando* inyección de *morruato al 5%* 5 cc. por el cabo distal safeno, tenemos, si es cierto con menor número, el mismo porcentaje de 20.83% de recidivas en nuestros operados por lo tanto semejante portentaje de éxito. (4) Con la *ligadura alta de la safena* i sus colaterales del cayado pero *ligando las comunicantes* profundas inferiores, en ocho enfermos, no hemos tenido hasta la fecha, recidivas. (5) Con la *ligadura de las comunicantes i morruato en* el cabo safeno inferior para los casos ya operados con la ligadura alta i recidivados, tenemos que con ocho enfermos el éxito ha sido remarcable pues no se han presentado recidivas. (6) Por último i para poder comparar con lo anterior, decimos que con la *técnica de Moreschi* encontramos un 100% de recidivas. En nuestro cuadro parece paradojal que encontremos mayor número de recidivas que pacientes anotados, pero ello se debe a que otros dos pacientes fueron operados en otros hospitales i al revisar sus historias clínicas ellos habían recidivado como nuestros seis pacientes operados.

10. En cuanto a los *otros tratamientos efectuados*, ellos han sido diversos, entre los que anatamos: (1) La resección de la úlceda con un 100% de recidivas en nuestros dos casos. (2) La simpaticectomía lumbar i simpaticotomía peri-arterial de Leriche con un 50% de recidivas en cuatro casos anotados. (3) Con la aplicación de injertos de Thiersch o Corachan en los tejidos ulcerosos ya preparados, hemos tenido 44.4% de recidivas. (4) En un solo caso hemos empleado *la radioterapia* sin encontrar en él la mejoría o curación que esperábamos. (5) Se ha movilizado en ciertos casos los planos profundos incluso a veces *con la resección de un segmento óseo* que en algunos pacientes han estado afectados así como otros tejidos (muscular, nervioso, etc.), obteniendo en tres pacientes una curación evidente.

11. En cuanto a los *complicaciones postoperatorias*, debemos hacer resaltar que en nuestros ciento cincuenta casos aquí estudiados, las temidas flebitis o tromboflebitis no las hemos conocido en esos pacientes, por lo cual con satisfacción anatamos: cero por ciento. Solo tenemos que consignar entre las complicaciones postoperatorias una discreta infección local asi como una linfangitis, consecutiva a una safenectomía.

De la exudación de la herida operatoria por la retención de hilo o mala calidad del cat-gut para la hemostasia, apenas si vale la pena consignarlas en este lugar porque se han presentado en un escaso número de operados i estrictamente no son complicaciones postoperatorias sino que caerían dentro de la evolución de la herida.

12. *La Permanencia Hospitalaria* ha sido relativamente corta pues la mayoría de nuestros pacientes (42.66%) ha permanecido entre 10 i 20 días, incluyendo en ellos el tratamiento de afecciones concurrentes: bronquitis, acarosis vecinas, impétigo, sepsis oral, etc., o espera de exámenes de laboratorio o citas para las radiografías venosas, etc., que no es del caso consignar.

Como un dato omitido en la exposición anterior, agregamos lo relativo a las ocupaciones de los pacientes, que son:

	Casos	%
De pie	125	83.3
Sentados	20	13.3
Otros	5	3.3

CONCLUSIONES

1. Las várices avanzadas en los pacientes del Hospital Obrero de Lima, se presentan en mayoría entre los 21 i 30 años, para descender en número conforme se avanza en edad.

2. Nuestros casos mas numerosos se presentan con antecedentes de 1–5 años de enfermedad, para decrecer casi, en 50% con el mayor tiempo si aumenta de 5–10 años.

3. La pierna izquierda es mas afectada que la derecha en cuanto a las várices, con un 40% del total.

4. De los sistemas venosos safenos del miembro inferior, el interno unilateral predomina en casi 71% de los casos.

5. Las úlceras varicosas constituyen una mortificante complicación en 53.33% de los pacientes.

6. Para el éxito del tratamiento de las várices avanzadas, es necesario emplear el método combinado quirúrgico-esclerosante, previo estudio de la circulación venosa superficial i profunda.

7. Nos permitimos recomendar este método con el agregado de injertos en los casos necesarios de úlceras varicosas.

Editorials

Sludged Blood

AFTER 16 years of study of the circulating blood in the organs of experimental animals and on the bulbar conjunctivae of human beings a report * has been published which throws new light on the properties of normal blood, blood flow and vessel walls. The observations were made by transillumination with light-conducting fused quartz rods under a magnification of 16 to 100 times. In human beings the unanesthetized bulbar conjunctivae were observed with binocular microscopes and oblique illumination of the universal slit lamp or ophthalmoscope lamp.

The authors report that in normal blood and normal vessel walls erthyrocytes tend to repel each other slightly; that rouleau formation does not take place in carefully handled tissues; that normal red blood cells in healthy young human beings were not coated with microscopically visible protein precipitate; that neither red nor white blood cells cling to the walls of small vessels; that the inner surface of small vessels is smooth and clean.

Normally, unagglutinated blood flow was stream-lined, the cells being arranged in concentric laminae, the center one passing along most rapidly. It was found that the rates of blood flow through each tissue of each organ set the maximum rate at which the cells of that tissue can receive blood-borne materials.

A crude but accurate criterion for adequate rates of blood flow through open-tissue capillaries was the fact that in most arterioles and venules 60 to 120 μ in diameter blood flowed so rapidly that individual red cells could not be seen. It was found that almost every arteriole-to-capillary or sinusoid-to-venule pathway could contract so tightly as to resist the entrance of blood, and that individual parts or all its parts could dilate maximally, the limits of physiologic dilatation being fixed by the elastic limit provided by the mesh of connective tissue fibers surrounding each arteriole. Most capillaries were able to dilate without losing tonus but not much more than two or two and a half times the diameters of the animal's own erythrocytes. This applies also to the bulbar conjunctivae of human beings in whom red blood cells usually measure 8 μ in diameter. Hence, in health and disease the arterioles and capillaries constitute a perpetual bottleneck.

In a variety of acute and chronic diseases of lungs, heart, gastrointestinal tract, thyroid and blood, as well as in tuberculosis, hypertension, leukemia, etc., blood cells were found to be agglutinated into masses (not rouleaux), changing the blood from its normal relatively fluid state to a circulating sludge. Sludged blood was found in 12 of 21 women with normal pregnancy whereas of 23 women with various complications of pregnancy sludged blood was found in 22. In a large number of patients studied, arterioles were found temporarily and permanently plugged with masses of sludge and in some short spindle-shaped bulges (aneurysms) of arterioles. Red and white cells were seen sticking to the lining walls of vessels, and circulating masses of agglutinated white and red cells were seen to enter and plug small arterioles with subsequent dilatation, bulging, sacculation and leakage of fluid into surrounding tissue. Where sludging of blood had advanced there was evident slowing of circulation.

In an effort to determine how sludged blood damages the body certain concepts were developed: (1) the resistance of sludged blood to its own passage through the bottlenecks of the circulatory system forcibly reduces the rates of blood flow through all the open vessels of the body. (2) Agglutinated red cells are ingested and destroyed in the phagocytic cells

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* Kniseley, M. H., Bloch, E. H., Eliot, T. S., and Warner, Louise: Sludged Blood, Science, 106:431, Nov. 7, 1947.

of liver and spleen. (3) *There is settling and* sedimenting of masses of agglutinated blood cells out of the moving blood plasma during life. (4) Various degrees of reduction in circulating blood volume caused by (1) and (2) initiate intermittent, prolonged, controlled shutting off of the arterioles of a selected series of tissues and organs.

Detailed studies were made on various sludges and their effect in the body. For instance, it was found that no patient with grossly visible edema during bed rest failed to have large semirigid masses, visibly slowed rates of blood flow through the conjunctival vessels, different degrees of plasma loss through the vessel walls and of microscopically visible hemoconcentration, conjunctival edema, etc. In a number of deeply comatose human hospital patients the blood was seen to have been agglutinated into large, sticky, *pasty wads moving very slowly through* rapidly leaking vessels These are only two of a wide variety of highly interesting findings reported.

The authors emphasize that the hope provided by these studies is that as we learn how to keep blood normally unagglutinated and fluid, vessel walls intact, normal red cells from being destroyed, and adequate blood volume present, many effects of other pathologic mechanisms will stand out unobscured by the sludge mechanisms. This opens the field to intensive investigation of sludges by the methods available today.

Until the sludge mechanism has been thoroughly investigated any therapeutic attempts to combat sludging by the administration of anticoagulants should be highly experimental.

L.G.

Surgical Implications of Acute Infectious Hepatitis and Its Residual Manifestations

THERE is great need for a wider acceptance clinically and for a more thorough understanding of hepatic insufficiency in its latent and apparent stages and in the broadest possible sense. As an important factor in the resistance to the stresses and strains of large scale operations, and in the successful outcome of the latter, the role of this disability is tremendous and should be more and more understood.

Study of acute and chronic hepatitis has been stimulated by the extraordinary abundance of clinical material provided by a pressing war time and postwar problem. Ideas regarding latent and subclinical forms of liver diseases have been confirmed New knowledge has been gained about the development of the essential pathology by the increased use of serial and repeated aspiration liver biopsies, and the pathologic physiology of the liver related thereto has been made clear by comparison of the anatomic pictures so visualized with reliable old and more sensitive new tests of liver function. Now the clinical concept of these forms of hepatitis fully approximates that of other forms of visceral disease. It seems advisedly necessary to recapitulate the entire picture.

Acute infectious hepatitis in any form is a primary liver disease. Lichtman[1] distinguishes this from liver disease secondary to other disease entities (e.g., cardiac disease, hyperthyroidism, malaria, etc.), or considers it an associated type (hepatorenal disease, Wilson's disease, etc.). The pathology in each is distinct but the clinical effects frequently are identical.

In the prodromal and preicteric stage of acute infectious hepatitis, it is common to observe chills and fever reaching to daily peaks of 102° F. for a number of days, accompanied by headache, weakness, malaise, and generalized aches and pains. There are frequent upper respiratory symptoms of rhinitis and sore throat, and lower respiratory signs of cough, chest pains and occasional rales referable to the lungs. It is common to mistake these preliminary signs for those of an influenzal infection.

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[1] Lichtman, S. S.: New York Med. 3:19, 1947.

When the disease is fully formed, there are: gastroenteric symptoms of pyrosis, nausea and vomiting, eructations and postprandial distress; upper and lower abdominal pain and cramps, diarrhea and undue expulsions of gas. Then the dominating liver symptoms of jaundice and biliuria with all the usual accompanying laboratory evidence appear and continue.

With this come the parts of the picture which are not usually emphasized. There is frequent mention of splenic enlargement (Jossem,[2] Wayburn,[3] Lucké,[4] Finks and Blumberg,[5] Goodman,[6] Klatskin and Rappaport[7] and others). This was determined by palpation, x-ray and necropsy examination. The reported numbers of splenic enlargement vary from 48 to 75 per cent of the total number of cases of hepatitis observed. Inasmuch as the enlargement may be of small extent, and/or was not observed and reported, it is not too much to assume that some degree of splenic enlargement occurs in a number sufficient to make it an almost universal manifestation of the disease.

There are a number of reports in which enlargement of the lymph nodes is mentioned. Barker, Capps and Allen[8] observed this in 81 per cent of their cases; and the pathologic nature of such involvement was described by Fox[9] who saw reticuloendothelial hyperplasia at necropsy.

Alterations in the hematopoietic system in hepatitis have been observed by many. As long ago as 1923 such changes were described by Jones and Minot[10] and reviewed by Goodman[6] in 1947. The signs noted included diminutions in the red cell count (3 to 4 million) and in the hemoglobin content (12 to 13 Gm.) which is most marked shortly after the peak of the jaundice. There is also an increase in the platelet count. After a preliminary slight white cell increase there follows a leukopenia with a relative increase in the lymphocytes (up to 50 per cent) and large mononuclears (up to 12 per cent). The most characteristic feature is the occurrence of immature and abnormal lymphocytes and large mononuclears. In Goodman's cases the Paul-Bunnell test was always negative.

Simultaneous enlargement of liver and spleen has been noted by Landolt[11] in infectious mononucleosis and the resemblance to hepatitis seems to be strengthened since in the former urobilin and urobilinogen also are frequently present in the urine. Apparently this phenomenon, too, has been noted by Goodman. In discussing hypertrophic cirrhosis of the Hanot type, unassociated with calculous disease and infection in the major ducts, similar simultaneous enlargement of liver, spleen, lymph nodes and pancreas have been noted in the literature by Wilensky.[12]

Goodman correlates the data regarding etiology, symptomatology and pathology of acute hepatitis, and emphasizes the simultaneous involvement of spleen, liver, bone marrow and lymph nodes which are the principal components of the reticuloendothelial system. Nevertheless, his visualization, of acute infectious hepatitis "as a disease . . . with pathologic alterations in the component parts of the reticuloendothelial system" cannot be well taken, because in acute infectious hepatitis there is a host of observations to show that anatomically the intralobular framework of the liver, which is part of the reticuloendothelial system, is always intact and apparently unaffected, and that the lesion is exclusively a disease in which the parenchymal cells alone are destroyed.

This anatomic distribution of the lesions in acute hepatitis corresponds, from a vascular standpoint, with the territorial arterial supply of the mesenteric axis. It is interesting to speculate upon the possible pathogenetic significance of this anatomic fact. It probably bespeaks an approach of the causal agent through the arterial stream of the mesenteric axis. This seems to indicate a hematogenous infection, and the common occurrence of prodromal upper and lower respiratory manifestations may indicate the entry of the causal agent through the nasopharynx. It definitely denies a distribution through the portal vein and its tributaries, and probably predicates that the causal agent is not absorbed from the alimentary canal.

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[2] Jossem, J., Harefuah: J. Palestine Jewish M. Assoc. 19:25, 1940 (cited by Cameron, J. D. S.: Quart. J. Med. 12:139, 1943.

[3] Wayburn, E.: Gastroenterology 4:147, 1945.

[4] Lucké, B.: Am. J. Path. 20:595, 1944.

[5] Finks, R. M., and Blumberg, R. W.: Arch. Int. Med. 76:102, 1945.

[6] Goodman, J. I.: Am. J. Dig. Dis. 14:26, 1947.

[7] Klatskin, G., and Rappaport, E. M.: Ann. Int. Med. 26:13, 1947.

[8] Barker, M. H., Capps, R. B., and Allen, F. W.: J.A.M.A. 128:997; 129:653, 1945.

[9] Fox, J. P., Manso, C., Penna, H. A., and Para, M.: Am. J. Hyg. 36:68, 1942.

[10] Jones, C. M., and Minot, G. R.: Boston M. & S. J. 189:531, 1923.

[11] Landolt, R. F.: Schweiz. med. Wchnschr. 72:1346, 1942; abstr. J.A.M.A. 123:176, 1943.

[12] Wilensky, A. O.: Am. J. Digest. Dis. 14:74, 1947.

The statement usually made (Lucké and others) that the largest proportion of cases of acute hepatitis recover completely is contradicted by other observers (Kalk,[13] Sofer,[14] Kornberg,[15] Altschule and Gilligan,[16] who found impairment of liver function in a high proportion of those who were considered to have recovered from the acute attack. In various groups and in various combinations this was associated with hepatomegaly or with other symptoms.

In individuals with severe and protracted *jaundice during the acute phase*, there was a significant higher incidence of residual manifestations than in the others. There was no perceptible difference in cases with single episodes of jaundice as compared with those having multiple attacks of jaundice. Apparently the time element is very important in determining the susceptibility of the liver to a second injury. If sufficient time has elapsed the susceptibility may be normal, even if complete structural and functional restoration has not taken place.

Hepatomegaly alone and/or hepatosplenomegaly in any combination is decisive evidence of previous or present liver disease even if symptomless at the moment. The clinical significance of the enlargement must be integrated, however, with the symptomatology and with all laboratory data. Residual symptoms, aggravation of symptoms, or recurrences of symptoms accompanied by increased tenderness of the liver, indicate the latency of the underlying condition in the symptomless periods. The flaring up of symptoms in some of these cases may be directly attributed to undue stress of any kind (e.g., *an operation*).

A great variety of symptoms have been attributed by Kalk to the residual damage in the liver following an attack of acute hepatitis. Klatskin and Rappaport found that only fat intolerance and pain could be considered significant because the other symptoms could not be traced to an attack of jaundice or to other pertinent factors. Only moderate or severe degrees of discomfort were considered significant. Fat intolerance was by far the most striking and frequent symptoms. Pain was associated most commonly with fat intolerance and was poorly localized in the right upper quadrant and epigastrium. Objectively, hepatomegaly was present in a large percentage and in some splenomegaly was present also.

Confirmation of the presence of liver damage is always dependent upon the demonstration of aberrations of liver function. *Inasmuch as no known single test is capable* of showing abnormal liver function accurately and decisively, because the various tests react differently and with varying intensity in different individuals, it is necessary to study liver function by all the methods available. In many clinics a working estimate of liver function is made by determining and integrating the one-minute and total serum bilirubin estimations, the cholesterol and cholesterol ester content, the thymol turbidity and cephalin-cholesterol flocculation reactions, the bromsulfalein excretion, the quantitative urinary urobilinogen excretion, and the total serum proteins and albumin-globulin ratio. In any event, a single observation is of little or no clinical importance, but a series of repeated observations, combined with aspiration liver biopsies, give important evidence of the continued development or possible retrogression of the essential lesions.

It seems true, that under conditions of advanced disease, functional hepatic failure occurs and is analogous to cardiac failure. Hepatic failure is not always predictable, but when such an event is suspected the imminence of the complete breakdown may be gleaned from an integrated consideration of all the symptoms and observable signs, with the results of all available forms of laboratory investigation of liver function. When any form of surgery is contemplated, this item becomes a matter of utmost importance and cannot be minimized. Many surgical operations are unsuccessful because of hepatic failure.

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[13] Kalk, H.: Deut. med. Wchnschr. 58:1078; 57:1119, 1932.

[14] Sofer, L. J., and Paulson, M: Arch. Int. Med. 53:809, 1934.

[15] Kornberg, A.: J. Clinical Invest. 21:299, 1942.

[16] Altschule, M. D., and Gilligan, D. R: New England J. Med. 231:315, 1944.

The nature of residual and recurrent manifestations sometimes is difficult to evaluate properly. This is enhanced moderately often, especially in service and ex-service individuals in whom one must distinguish between hepatitis and yellow fever jaundice, or homologous serum jaundice, or arsenotoxic hepatitis, or chronic poisoning with atabrine, or must decide that the hepatitis is associated with one of the latter. When the interval between the original episode of hepatitis and the later secondary manifestations is of long duration one must also decide if this be a residual or recurrent manifestation or whether it is a fresh reinfection.

Several observers (Caravanti,[17] Benjamin and Hoyt[18]) have denied the relationship of these symptoms to a chronic, latent, or residual liver damage because many of the patients with psychogenic factors also had hepatomegaly and impairment of liver function. Kalk notes that the clinical picture of the hepatitis cases frequently simulates that of a psychoneurosis, and thinks that the symptoms of the latter result from the aberrations of liver structure and function. In the cases coming under my observation I noticed this apparent psychoneurotic behavior. Lichtman interprets the symptoms as an "effort syndrome" in which the individual focuses his complaints upon the liver and gastrointestinal tract rather than upon the heart. Sherlock and Walsh[19] describe patients who by continued practice learn to push their abdominal organs down so that liver and spleen of normal size become palpable and therefore, erroneously, are considered to be abnormally large.

There is debate over the question of whether infectious hepatitis may go on to cirrhosis. Most workers in the field (Kalk, Sofer and Paulson, Altschule and Gilligan, Polack,[20] Dible, McMichael and Sherlock[21]) take the view that the "vast majority of nonfatal cases of acute hepatitis go on to clinical recovery, that a variable proportion of these have residuals which are compatible with good health, but that occasionally the latter are progressive and result in cirrhosis." Lucké's experience fosters the view that cirrhosis never occurs. Undoubtedly in some instances, at least, the differences are due to diverse interpretations of the visible connective tissue changes, and, possibly, to the multiple terminologies in which "cirrhosis," nodular hyperplasia, bile-duct proliferation and fibrosis of the portal tracts are confused. Klatskin and Rappaport could find no instance of proved Laennec's cirrhosis in which they could unequivocally establish a diagnosis of acute infectious hepatitis at the onset of the disease. In many they found evidence that the cirrhosis antedated the onset of an infectious hepatitis. Lucké also saw this. In nodular cirrhosis, however, the evidence clearly indicated that the cirrhosis was a sequel of infectious hepatitis. I believe, myself, that some of these changes are undoubtedly scarring. By the same token, I believe that if the causal agent gets out into the lymphatic channels in the interlobular sept. the resultant lymphangitis may eventually cause chronic hypertrophic connective tissue changes which are the basis of cirrhosis of the portal type.

At any rate, the observations indicate that acute hepatitis is a very severe lesion; that its effects continue in many much beyond the period of its apparent cure; that residual symptoms are common, and recurrences and renewed infection appear at various intervals for long periods of time; that in some, at least, a real permanent cure never takes place; and that even functionally compensated latent, or subclinical cases are especially vulnerable to all hepatotoxic agents and renewed infection. These individuals are not well and complain so much and so constantly that their manifestations may be improperly considered as an emotional disturbance, and regrettably attributed to a psychoneurosis.

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[17] Caravati, C. M.: Southern M. J. 37:251, 1944.

[18] Benjamin, J. E., and Hoyt, R. C.: J.A.M.A. 128:319, 1945.

[19] Sherlock, S. P. V., and Walsh, V.: Lancet 2:482, 1946.

[20] Polack, E.: Acta med. Scand. 93:614, 1937.

[21] Dible, J. H., McMichael, J., and Sherlock, S. P. V.: Lancet 2:402, 1943.

There is also the further necessity of integrating the old knowledge with the new experience, especially from the point of view of establishing the possibility or improbability of any subsequent connective tissue change of the nature of a cirrhosis.

In any event it seems that the statistics showing cures of acute hepatitis up to 85 and 90 per cent, will ultimately need considerable revision both from the standpoint of cure of the cellular destruction, and the possible late formation of connective tissue changes in the liver framework approaching those seen in the frank cirrhoses.

The surgical significance of all this seems apparent. These residual cases are commonly of no, or very little, subjective recognition, or objective demonstration, and frequently are latent or subclinical conditions. It will undoubtedly come to pass that cases will present themselves for operations of greater or lesser magnitude for various indications unrelated in any way to any liver disease, and the incidental presence of the latter may be sufficient to cause unexpected disturbing events during the recovery from the operative insult, the healing of the wound, and in the protracted convalescence. In other more advanced cases, the imminence of hepatic failure is not recognized, operation is proceeded with, and fatalities then occur because hepatic failure is, except in rare instances, the irreversible stage of this disease. When the possibility of hepatic failure is recognized or suspected, operation should be refused as the risk is almost, if not entirely, absolute. In ex-military men this should have special significance and when such individuals are faced with any large scale operation, the condition, function, and possible anatomic change in the liver should be thoroughly investigated, and any discovered abnormality be corrected as much as possible.

Again a different form of difficulty arises in such individuals when there has been a preceding operation for gallbladder and calculous disease. Should symptoms occur later one must distinguish between a postcholecystectomy syndrome and/or recurrent postoperative cholelithiasis and residual or recurrent manifestations following the acute hepatitis or whether both of these conditions coexist. The symptomatology is similar even to the presence of jaundice. Nevertheless, the differentiation is most important and desirable if unnecessary operations are to be avoided, if proper precautions are to be taken when the latter are obligatory, if unsuspected or predictable untoward and dangerous postoperative effects are to be avoided or lessened, and if fatalities are to be prevented, or their number brought to a minimum.

A. O. Wilensky

News Notes

The **Sixth International Assembly of the International College of Surgeons** took place in Rome, Italy, from May 16 to May 23, 1948. It was followed by three "Surgical Days" in Turin, to commemorate the contributions to surgery of Profs. Carle, Uffreduzzi and Donati. The Rome Assembly was held under the Honorary Presidency of Prof. Rafaele Bastianelli and the active Presidency of Prof. Rafaele Paolucci.

The attendance exceeded expectations. The scientific papers, the clinics, the social activities contributed to the success of the occasion. A reception of the entire Assembly by the Pope was held in the Vatican.

A detailed report of the activities of the Assembly will be published in the next issue of the *Journal.*

The **International Society of Orthopaedic Surgery and Traumatology** will hold its Fourth Congress in Amsterdam, Holland, Sept. 13 to 18, 1948. Any orthopedic surgeon who may be in Europe during the time of the Congress is invited to attend the scientific sessions and social functions of the Congress. Surgeons who wish to attend are requested to notify Dr. J. Delchef, Secretary General of the Society, Rue Montoyer 34, Bruxelles; Dr. J. D. Mulder, Secretary of the Congress, Vondelstraat 75, Amsterdam, Pays-Bas; or Dr. Henry W. Meyerding, President of the Congress, 102–110 Second Ave., Rochester, New York, of intention to attend, time of arrival, etc., so that reservations may be arranged. An interesting program of scientific papers and entertainment is being prepared.

Following the recent meeting in New York of the **Council** of the **World Medical Association,** members of the Council and their wives visited the Mayo Foundation in Rochester and the University of Minnesota. Members of the visiting party were Dr. and Mrs. T. C. Routley, Canada; Dr. and Mrs. O. Lench, Switzerland; Dr. and Mrs. John Yui, China; Dr. and Mrs. L. G. Tornel, Spain; Dr. and Mrs. D. Knutson, Sweden; Dr. and Mrs. S. C. Sen and daughter, India; Dr. J. A. Pridham, England; Dr. A. Hartwich, Austria; Dr. E. Marquis and Dr. P. Cibric, France; and Dr. J. Stuchlik, Czechoslovakia.

Dr. **Joseph J. Toland, Jr.,** of Philadelphia, F.I.C.S., has been elected to honorary fellowship of the Gesellschaft der Aerzte of Vienna, Austria.

Dr. **Charles Arnold,** Hon.Prof. of Surgery, West China Union University, Chengtu, Szechwan, China, has been appointed surgical consultant. The appointment came from the Surgeon General in Washington, with the request that Dr. Arnold also visit all army hospitals in the Far East and give a course of lectures to the staff in each place.

The **Fifth Inter-American Congress of Surgery** will be held at La Paz, Bolivia, from Oct. 12 to 21, 1948. Surgeons are invited to attend. Dr. Daniel Bilbao is Vice-President, and Dr. Enrique Berrios is Secretary General of the Congress.

The appearance of Volume I, 1948, of the **Harofe Haivri,** The Hebrew Medical Journal, inaugurates the twenty-first successful year of its publication under the editorship of Moses Einhorn, M.D. The founders had faith in the vitality and growth of modern Hebrew and foresaw that a Hebrew medical publication would be of service to the future medical department of the Hebrew University and of value in the development and advancement of Hebrew medical literature. Original articles are summarized in English to make them available to those who are unable to read Hebrew.

New Books

Pye's Surgical Handicraft. Edited by Hamilton Bailey, with 43 contributors, Ed. 15, Baltimore, The Williams and Wilkins Company, 1947. This unusual "handbook" has accomplished what others have attempted but failed to do. It has condensed many valuable technical procedures and an extraordinary variety of material in little space without losing any of their worth. It contains many fine ideas, procedures and other details not generally found in textbooks and each is handled concisely and brilliantly. Proper tribute is paid the pioneers of the technics quoted. To save the reader time, most technical procedures have been presented pictorially, yet the written accounts leave nothing to the imagination, thereby preventing confusion. Methods of choice are discussed freely, and reasons are given why the editor has chosen these procedures above others, as based on physiology, pathology, anatomy and related sciences. In fact, the book covers almost every phase and aspect of hospital routine, both for elective and emergency surgery, so that no detail of the work which may fall on intern or resident or senior house staff has been omitted. The book may be considered a gold mine of ideas, giving emphasis to the factors which make for diagnostic accuracy and are an aid not only to the student, but to the general practitioner as well. As a quick reference work one would have to look far to find one that surpasses this new edition of an old standby.

A Manual of Fractures and Dislocations. By Barbara Bartlett Stimson, Ed. 2, Philadelphia, Lea & Febiger, 1947. The book is abundantly illustrated with line drawings. No reproductions of x-rays are used. The principles of fractures and dislocations are emphasized and methods which the author has found useful in applying these basic principles are clearly and concisely described. One of the large merits of the doctor's publication is its brevity. The author has divided her work into 21 chapters, using a single chapter to describe the injuries of one particular portion of the anatomy of the body. This simplifies presentation of the work. The author's references are few and her index is adequate. The book would be an excellent one for students to use.

Principles of Occupational Therapy. By Helen S. Willard and Clare S. Spackman, Philadelphia, J. B. Lippincott Company, 1947, 416 pp. The work, the combined result of the efforts of 20 contributors, is divided into two sections which contain 14 chapters. Many forms for keeping records are illustrated. I think the book would be greatly enhanced if it contained more photographic illustrations of types of patients and types of treatment. It is indeed complete with considerable information concerning many of the occupational therapy procedures that have been developed before and during World War II. It would be a very handy book for the shelf of every doctor, nurse, and social worker. It has an excellent chapter on the treatment of paraplegics, and also a chapter on reduction of amputees.

History of the American Medical Association. By Morris Fishbein, Philadelphia, W. B. Saunders Co., 1947. The author-editor and his coauthors are to be congratulated upon having gathered together an encyclopedic array of data of the American Medical Association's first century, in honor of which it was published. The rise of the Association as a great organization covers a period of unsurpassed progress in the Science and Art of Medicine.

In this well written, very readable history the practicing physicians of America will find brief sketches of leaders in American medicine as well as of many of their friends and teachers. The book also will appeal to a lay audience. Fielding Garrison would have been delighted with the book and it is unfortunate that he could not have been living and among the coauthors.

In its growth and development the American Medical Association has kept pace with unparalleled discoveries and developments in the diagnosis and prevention of disease—discovery of bacteria as the cause of disease, the rise of preventive medicine and public health, discovery of new drugs, etc. Naturally, this volume emphasizes the campaigns to raise the standards of medical education, to combat quackery, nostrums and frauds in the medical field, to improve industrial health, and to provide a wide distribution of a high quality of medical care. The inclusion of the histories of the Councils, Bureaus, and publications of the American Medical Association is a unique stroke and has greatly enhanced the value of the book.

The book should also prove to be a convenient reference for doctors active in medical organization.

made but is written in a manner so interesting that the reader is unaware of the truly scientific nature of the work.

Most of the criticisms of the book have questioned the validity of the statistics, saying that the subjects could not be expected to remember many of their experiences and that some would attempt to brag about theirs. Be that as it may, the subjects are only human and Kinsey has taken that factor into consideration in the form of the questions and the manner in which they were presented.

The statistics have been arranged in three main groups; social level, educational level, and occupational level. Reference is continually made to "upper" and "lower" classes, the former being an educational attainment of more than 13 years of schooling and an occupational class (ranging from 1—laborer to 9—extremely wealthy) of 7 which is the professional class. The "lower" level refers to an education consisting of less than 8 years with other groups falling between these extremes.

The differences in mores between upper and lower social level groups are reflected in the striking differences in sexual behavior between those groups.

That much of the sexual behavior follows religious, moral and cultural training is shown by Kinsey in his statistics on various phases and aspects of sexual experience and the effect of restraint on the various levels.

It is not the purpose of this review to present the multitude of interesting and previously unknown facts about our sexual behavior. That can be obtained only through reading the book. The fact that it has approached best-seller proportions even at the price of $6.50 points to the interest the public has in the subject if only for the purpose of rationalization of one's own behavior and to see how one compares to others on this usually taboo subject.

For the professional group the reading of "Sexual Behavior in the Human Male" is indispensable. It gives the "upper level" group a better understanding of the behavior of the "lower level" group where counselling, venereal disease control, sex crimes, and illegitimate births are vital problems.

Kinsey's study is an excellent work in a field where few facts have previously been attained because of social taboos, ignorance, and prejudice, and the scientific world eagerly awaits the publication of his forthcoming volumes.

Actions of Radiations on Living Cells, by D. W. Lea, New York, The Macmillan Company, and University Press, Cambridge, 1947, 402 pp. This book is recommended to those interested in a clear and well written treatise on the fundamental actions of ionizing radiations and x-rays on living cells. The early chapters describe the important chemical effects and pertinent relating physical properties that such ionizing radiations have upon living matter. A large portion concerns itself with a dissertation on the effects of such radiation phenomena upon viruses, genes or chromosomes of some of the more highly organized and complex living cells. The last chapter presents a valuable and lucid description of the mechanism whereby cells are killed by the effects of such radiation agents.

As one reads this book, one is impressed with the painstaking effort made by the author to present the subject matter in a clear and concise manner, written primarily for those of us whose grounding in mathematics may be somewhat elementary in respect to advanced physics and calculus. After a careful reading of the contents of the various chapters, studying its explanatory charts and graphs, as well as an appendix containing supplementary calculations, and an extensive bibliography, the reader is impressed with the great basic value of this new book. It can be highly recommended to those interested in the fields of x-ray, radiation therapy or in fundamental nuclear physical research.

This book will prove to be of major importance for investigators in the broad fields of biology, gynetics and medicine.

Benjamin Silliman, Pathfinder in American Science, by John F. Fulton and Elizabeth H. Thomson, New York, Henry Schuman, 1947. It is well for Americans to study the life of this founder of American scientific teaching. One learns quickly that Benjamin Silliman, while a devoted teacher, did not spend all of his time in the cloistered shelter of Yale College. Instead, he visited, communed, and correseponded with all men of science in whatever country they resided. He participated vigorously in the affairs of the country which deeply affected his convictions (viz: the Civil War). While his original discoveries were limited, his surveys and teachings led to the founding of such native industries as coal and petroleum.

The authors have pictured a sober, God-fearing scientist who permitted little inner conflict between the laws of science and God. This is and was a conflict which many great minds have had difficulty in resolving. One has the feeling that there were more facets to Silliman's personality than the

Abstracts from Current Literature

A Comparative Study of the Action of Demerol and Opium Alkaloids in Relation to Biliary Spasm, E. A. Gaensler, J. M. McGowan, and F. F. Henderson, *Surgery, 23:211, Feb 1948.* While the spasmolytic action of demerol has been demonstrated experimentally, there have been few studies in man to substantiate the expected relaxing effect on intestinal and urinary tract. In a *previous study by J. M. McGowan and co-authors* measurement of pressure changes in the common bile duct showed that spasm of the muscle of the second portion of the duodenum occluded the lower end of the common bile duct with a sphincterlike action. It was concluded that while the sphincter of Oddi may exist as a separate entity its function is physiologically synchronous with that of musculature of the second portion of the duodenal wall. For this reason the term, duodenal spasm, refers to spasm of the sphincter mechanism of the biliary tract (sphincter of Oddi). It was found that spasm of the second portion of the duodenum was produced by codeine, dilaudid, pantopon and morphine. This spasm caused enough back pressure in the biliary tract, in some cases, to produce an *attack of biliary colic. The nitrite drugs, aminophylline* and epinephrine, relaxed this spasm. This same method of pressure studies has been found useful in determining the optimum time for removal of the T-tube.

The present pressure studies revealed that demerol is spasmogenic, rather than spasmolytic (as heretofore believed) in its effect on the sphincter mechanism at the lower end of the common bile duct (Oddi). In intensity the spasm was intermediate between that produced by codeine and that of morphine, and was sufficiently severe in two cases to produce typical biliary colic. It increased, rather than decreased, natural spasm. The spasm was regularly but briefly relieved by amyl nitrite or theophylline ethylenediamine *(aminophylline). Demerol, therefore,* should be used with as much caution as the opiates in post-cholecystectomy pain.

Carcinoma of the Gallbladder, Report of 75 Cases, F. P. Sainburg and John H. Garlock, Surgery, 23:201, Feb. 1948. The authors emphasize the importance of gallstones as a predisposing factor in carcinoma of the gallbladder. Since the disease is virtually incurable its occurrence must be prevented. And since the mortality rate of *malignant transformation in calculous gallbladders* far exceeds the prevailing operative mortality of cholecystectomy, the indication for removal even of asymptomatic calculous gallbladders on this ground alone is obvious. Symptomatically the disease is not recognizable until beyond curability.

Arterial Supply of the Distal Colon Pertinent to Abdominoperineal Proctosigmoidectomy, with Preservation of the Sphincter Mechanism, Harry E. Bacon and Caleb H. Smith, Ann. Surg. **127**:28, Jan. 1948. The experience of the authors with abdominoperineal proctosigmoidectomy with preservation of the sphincter mechanism in 264 cases *may be considered a method of study of the arteries* to the sigmoid and upper rectum. As such, it can be integrated with the experimental anatomic studies. Their studies of 264 cases at operation confirm the recommendation of both Sudeck and Hartmann that it is wise in each patient to observe the arterial pattern of the inferior mesenteric artery and its branches. In maintaining adequate blood flow to the rectum when the superior hemorrhoidal artery had to be ligated, the origin of the lowest sigmoidal artery became known as the critical point of *Sudeck. In the technic of* abdominoperineal sigmoidectomy with preservation of the sphincters, the last sigmoidal artery may be disregarded. The superior hemorrhoidal artery cannot be ligated below the origin of this vessel and allow sufficient mobility of the bowel to permit its being brought down to the anus without tension. As a corollary, it is impossible in performing this operation to clamp the superior hemorrhoidal artery at the critical point of Sudeck. In their operative experience the authors, by simple precautions, have been able to segregate those cases in which ligation may be made safely between the lowest two sigmoidal arteries from those in which ligation must be performed higher than the second lowest sigmoidal artery to assure viability. *Chief among these precautionary measures* has been transillumination of the mesentery before and after ligation of the [illegible] senteric
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Abstracts from Current Literature

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Original Articles

Prefrontal Lobotomy: Complications and Their Treatment[*][†]

JAMES W. WATTS, M.D., F.A.C.S., F.I.C.S.

AND

WALTER FREEMAN, M.D., F.A.C.P.
WASHINGTON, D. C.

PREFRONTAL lobotomy is a simple but precise operation. As soon as the nurses and anesthetists become accustomed to handling mental patients the operation proceeds quickly and smoothly. We have operated upon 531 patients a total of 610 times, with only 12 operative deaths. It has been necessary to terminate the operation before completion because of some complication in only 4 cases. Ordinarily, there is very little shock, and very slight loss of blood. In a few cases the blood pressure may fall considerably after the avertin is administered, and in others there is a definite fall in pressure after the prefrontal white matter is cut (Case 83). Stimulants are unnecessary in such cases, since the pulse and color remain normal. All that is required is to lower the table to the horizontal position.

Of the 531 patients upon whom prefrontal lobotomy was performed between September 1936 and July 1937, we have lost track of only two. We have made follow-up examinations or received reports on all the rest during the past year. The cases are numbered in chronological order, so that the first patient operated upon in 1936 is Case 1, and the last operated upon in July 1947 is Case 531. This method allows us to tell at a glance just where in the series a complication occurred.

OPERATION TERMINATED BEFORE COMPLETION

Prefrontal lobotomy was terminated before the operation was complete in four patients. During his third operation, one patient (Case 84) became restless, pulled the drapes loose, and contaminated the operative field, so that it was thought advisable not to proceed. The fourth operation, under general anesthesia, was successful. In a case of involutional depression (Case 8), while working on the first side, the blade of the Moniz leucotome broke and had to be withdrawn through an enlarged incision in the cortex, so we decided not to continue on the other side. There was no improvement. While performing a radical lobotomy in a schizophrenic (Case 320) subcortical bleeding occurred on the left side and respirations became irregular and shallow. We stopped operating after one side was completed and by the time the wound was closed, his condition was satisfactory. We proceeded with the second side six weeks later with a successful outcome. A patient with a tension state (Case 115) was being operated upon under local anesthesia for the third time when he became tense and restless. When sodium pentothal was injected intravenously he developed a severe laryngeal spasm and required the administration of oxygen and artificial respiration; large quantities of mucus had to be aspirated, and the operation was interrupted. The second side was operated upon a few days later. The man finally has been relieved of his severe neurosis, but because of his erratic behavior must be confined in an institution.

OPERATIVE HEMORRHAGE

A survey of our operative notes indicates that bleeding was considered more than usual in 23 cases. In one patient (Case 52) bleeding from the dura was followed by a fall

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[*] Read before the Twelfth National Assembly, United States Chapter, International College of Surgeons, Chicago, Sept. 28-Oct. 4, 1947.

[†] From the Department of Neurology and Neurological Surgery, George Washington University Medical School.

paralysis while in the hospital, and another developed a facial and abducens weakness within a week after returning home (Case 14). In the latter case a low-grade wound infection probably was the cause. In both patients, the weakness disappeared in a short time. Transitory aphasia developed on the fifth postoperative day in our first patient (Case 1).

CHRONIC INTRACEREBRAL HEMATOMA

Three patients developed hematomas within the subcortical incisions, and one a hygroma. In two patients (Cases 30 and 133) there was sudden onset of coma, in one (Case 267) the onset was gradual, and one patient was extremely lethargic continuously from the day of her second lobotomy (Case 88). A woman with involutional depression (Case 30), was convalescing satisfactorily, but on the eleventh postoperative day, while sitting up in a wheel chair, suddenly went into coma. Because of the sudden onset, a cannula was inserted into the subcortical incisions and 10 to 15 cc. of brownish fluid, looking like that in a chronic subdural hematoma, was withdrawn from each side. By the next day the patient had recovered consciousness.

On the fifth postoperative day, one of our patients (Case 133) suddenly became cyanotic, the pulse dropped to 42, respirations became irregular, and the blood pressure could not be obtained. Within twenty minutes her condition was satisfactory, but a similar episode occurred the next day. She again became cyanotic, her respirations were labored and the systolic blood pressure dropped to 45 mm. Hg. A cannula was inserted into the lobotomy and 5 cc. of dark blood were withdrawn from each side. The patient improved promptly and when the subcortical incisions were tapped again the next day no blood was obtained from the right side and only 2 cc. from the left. Her convalescence thereafter was uneventful except for the subsequent development of convulsive attacks.

Following her second operation, one individual (Case 88) exhibited extreme inertia for two weeks, and this was the indication for tapping the incisions.

Another patient (Case 267) gradually became more stuporous and four days after operation the spinal fluid was grossly bloody and xanthochromic with the pressure elevated to 18 mm. Hg. The following day the spinal fluid pressure was still elevated and, since the patient was still stuporous, a cannula was inserted into the subcortical incision in each frontal lobe. Xanthochromic fluid was withdrawn from each side, 45 cc. on the left and 90 cc. on the right. Promptly after this the patient regained consciousness. The presence of this clear yellow fluid indicated that the cavities communicated with the ventricles.

OPERATIVE DEATHS

Twelve operative deaths, 2.3 per cent. occurred in the 531 patients operated upon. Secondary operations with no operative deaths were performed in 70 cases. This brings the total number of operations up to 610 with an operative mortality of slightly under 2 per cent. The primary cause of death is listed in Table 1.

TABLE 1. SURGICAL MORTALITY

Cause	Case
Postoperative hemorrhage	3
Meningitis or brain abscess	3
Inertia and atelectasis	2
Atelectasis	1
Peritonitis	1
Shock	1
Unknown	1
Total	12

Postoperative Hemorrhage. Postoperative hemorrhage occurred in Cases 20, 32 and 488. Two of the patients (Cases 20 and 32) were operated upon in 1936 and 1937, respectively, and are described in detail in the first edition of "Psychosurgery." The first death (Case 20) was due to massive intracerebral hemorrhage which occurred three hours after operation and the patient died on the seventh postoperative day. Autopsy in the second case (Case 32) revealed that a short perforating branch of the middle cerebral artery had been torn while making a spherical cut with the leucotome. There were no deaths due to

can tolerate 50 mg. a day without discomfort, and the medication can be kept up for a long period. One of our patients (Case 152) continued her ration for two years and then found she could get along without it.

Benzedrine has the additional advantage of reducing the appetite and may thus help to control the patient's food intake. We have seen no harmful effects of prolonged administration of the drug. The difficulty usually resides in securing the cooperation of the patient (Case 389) in taking it regularly.

Atelectasis and Pneumonia. Atelectasis occurred in six patients and in two (Cases 46 and 271) it was a primary cause of the patient's death. In one patient (Case 271) the atelectasis may be attributed to an error in management. The patient was a 42-year-old woman with a catatonic excitement which had been present for 30 years. She was brought to the hospital under heavy sedation, having received four doses of morphine on the way. She took the anesthetic poorly, and the afternoon of operation the pulse was 140, blood pressure 178/40, and respirations 34. She was cyanotic and her breathing was difficult. Examination of the lungs showed evidence of atelectasis. The preoperative leukocyte count, which was 2000, first came to our attention after operation. No autopsy was performed.

Although they ran a rather stormy course, four patients (Cases 162, 219, 263, and 326) recovered.

The best treatment is preventive. The patients are turned in bed every two hours. When they are extremely inert, we sit them up in bed and pound on the back and chest to make them cough. *Bronchoscopic aspiration* was attempted in only one (Case 46), and it was unsuccessful.

Peritonitis. One patient (Case 182) died on the fourth postoperative day of peritonitis due to ruptured sigmoid diverticulum. This woman, who was 54 years of age, had rheumatic heart disease. In October, 1939, she had a series of cerebral emboli. The first affected her right side, and a few days later her left side became paralyzed. It was six months before she improved sufficiently to walk alone. About six weeks after the paralysis she began suffering disagreeable pains in the left side, particularly in the neck, and in the fingers of the left hand. The pain was so severe that she was confined to bed almost continuously. Lobotomy was performed June 15, 1943, in an attempt to alleviate the "thalamic" pain. There was considerable atrophy of the right frontal lobe. Following operation she was listless and sluggish, and winced considerably whenever the abdomen was touched. She no longer showed any reaction to manipulation of the painful left arm. Death occurred on the fourth postoperative day and autopsy revealed rupture of the sigmoid diverticulum *and generalized peritonitis. It also revealed* rheumatic heart disease with mitral stenosis and aortic insufficiency. The infarct of the brain on the right side involved the basal ganglia, but there was only secondary atrophy of the thalamus. The lobotomy incisions were clean.

Shock. A man with acute catatonic dementia praecox (Case 193) probably died of dehydration and shock. For five days before operation he had resisted efforts to administer liquids. We debated the safety of operation but decided to go ahead because of the danger of unrelieved catatonic stupor of such intensity. The pulse remained at 120 throughout the operation, and peripheral circulatory collapse made it necessary to cut down on veins to administer fluids. The patient nevertheless failed to regain consciousness and died on the seventh postoperative day. Necropsy was limited to the brain which revealed cerebral edema and clean operative wounds.

Cause of Death Unknown. This patient (Case 356) was a boy 12 years of age whose illness was classified as schizophrenia. There were no complications during a radical prefrontal lobotomy performed on Nov. 15, 1945, and his condition was satisfactory throughout the procedure. His reaction the following morning was most unusual. Apparently he was seeing things. At times there would be a look of stark terror on his face; then he might kiss the nurse on the arm or cheek, bite his finger nails, and kick his feet very rapidly. He was incontinent and vomited

tinued to grimace and to grab his legs when lightning pains occurred, he no longer complained and even denied having pain. On the second postoperative day he looked ill, the temperature jumped from 101.4° F. at 4 P.M. to 106.4° F. at 7:30 P.M., the pulse and respirations were rapid. Since no satisfactory cause could be found for his symptoms, narcotics were resumed. His condition remained critical for four days, but then improved. Narcotics were discontinued again on the ninth postoperative day, with no recurrence of symptoms.

When we operated upon a man with carcinoma of the larynx (Case 490) in April, 1947, we knew that morphine-withdrawal symptoms could occur, so we continued to give him narcotics for the first four days after operation When we saw him on the ninth day the sheets were wet with perspiration, his pulse and respirations were rapid, and he looked ill and apprehensive. Narcotics were resumed at three-hour intervals and the following day he appeared relaxed, his skin was dry, and the pulse and respirations were almost normal. He lived in comfort for several weeks *until he died from carcinoma.*

In patients who have been receiving large doses of opiates, it would seem that the combination of postoperative confusion and inertia prevented the patient from appreciating the discomfort due to the withholding of the drug. He was likely, therefore, to experience severe physiologic disturbance. It is well to continue for several days the habitual dose of the narcotic, then gradually to reduce the amount.

INCONTINENCE OF URINE

Urinary incontinence is almost always present after lobotomy. It may be absent or only fleeting if the upper quadrants are spared. Usually it is permanent if incisions are placed in the upper quadrants 15 to 20 mm. posterior to the coronal suture. The control of incontinence is in large measure a matter of regular trips to the toilet, maybe every hour at first, then every two hours and later at longer intervals. Retraining is important, since the patient may be too obtuse or too indolent to attend to his needs.

After lobotomy the bladder seems to have a lowered capacity and a more active stretch reflex. Voluntary control is somewhat impaired, as shown by the inability voluntarily to hold large quantities of urine.

Medical treatment of incontinence is not too satisfactory. Patients dislike atropine in effective doses, they require constant control to prevent them from drinking water when they get thirsty, and salt capsules administered at bedtime rarely are effective. The best treatment, aside from regular trips to the toilet, is ephedrine sulfate 30 to 50 mg. or even more—let us say, up to tolerance. The abnormal response of the bladder to distention (Langworthy, Kolb, and Lewis) may be somewhat reduced and a greater degree of flexibility may be attained.

RETENTION OF URINE

In contrast to the majority of our patients who are incontinent, a few develop urinary retention and require catheterization. One patient (Case 110) cleared up around the tenth day; another (Case 383) continued to have difficulty after going home, and three months later had his prostate removed. *Recovery was rapid and complete from both* operations.

EXCITEMENT

Just when excitement and resistance becomes a complication depends largely upon the endurance of the special nurse and tolerance of the other patients. During the past 11 years it has been necessary to transfer only seven patients, all men, to a psychiatric hospital on account of disturbing behavior. There have been many times when people have complained about the disturbing behavior of our patients, but by means of persuasion and sedation, electroshock and secondary operations, it has usually been possible to handle the situation. The appearance and behavior of one patient (Case 238) caused him to be transferred before he was even admitted to the hospital. Another patient (Case 50) became so noisy the evening of his operation that we could hear him half a block from the hospital. A recent schizophrenic (Case 499) was not noisy but became so assaultive that all three special nurses resigned and the general duty nurses would

Theoretical and Clinical Aspects of Vagotomy*

FELIX MANDL, M.D., F.I.C.S.
VIENNA, AUSTRIA

FROM September, 1947, to May, 1948, apart from the usual gastric operations in my department, I performed 101 vagotomies for ulcers of the stomach, pylorus, duodenum, jejunum and anastomotic recurrences after resection. Of these, 69 were ulcers of the pylorus and duodenum and in 13 the operation was combined with gastrojejunostomy.

Vagotomy in cases of ulcer of the stomach has been performed also where conditions such as severe starvation, severe heart and lung disease, and so on, contraindicated extensive resection. In all cases the x-ray findings cleared up after vagotomy. This seems to be characteristic of benign ulcerous lesions.

In one case a mass of lymph nodes in the supraclavicular region was found before operation. The histologic examination revealed an adenocarcinoma. The patient showed a typical x-ray picture of cancer of the stomach with a large defect in the greater curvature. At laparotomy an ulcerating malignant growth was found at this site, penetrating into the spleen. Metastases were present in the liver. Since the patient had had severe pain for months, vagotomy was tried as a palliative measure. It effected relief of pain, and the patient gained weight under a better diet, though the defect shown in the x-ray continued to increase. A colleague of mine (Dr. Steindl) performed vagotomy under the same conditions with the same result. Do these observations justify the conclusion that the vagal fibers contain pathways to the stomach?

Vagotomy has been performed in 6 cases of perforated ulcer. If the patient arrives as much as four to five hours after perforation, our routine procedure is simple occlusion by drain and omentum. In most of these cases a secondary operation on the stomach became necessary after a few weeks, either resection or vagotomy. In the 6 cases vagotomy was *attempted at the same time* as the occlusion operation. The vagal nerves fortunately could be found easily. The necessity for a second operation is not anticipated.

Some of our cases were complicated by other conditions: severe coronary and heart disease, 4 cases; chronic lung diseases, 3; epilepsy, 1; thyrotoxicosis, 2; megacolon, 1; pregnancy at 3 months, 1. In no case was the complicating condition aggravated by vagotomy, except possibly the case of a patient suffering from duodenal ulcer accompanied by cirrhosis of the liver, in whom the liver condition seemed to be worse after the operation. No complications arose from the vagotomy though theoretically such could be expected.

Of 101 patients operated upon, most of them poor risk cases, only one died on the tenth postoperative day of causes unrelated to the operative procedure. The patient succumbed to acute meningitis subsequent to tonsillar abscess and sinusitis.

No definite results can be given at present. But in a starving population vagotomy seems *to have enormous advantages. In the first* place, no postoperative regime is necessary, and secondly, there is no need for the routine preparation for a more extensive operation which, in view of the lack of drugs, would in any case be impossible.

All complications were carefully watched. In no case did a complication necessitate a second operation. Gastric and intestinal atony could be controlled with ease. One case of severe cardiospasm with temporary occlusion of the cardia, uninfluenced by papaverine and atropine, was rapidly and permanently relieved by the introduction of a large gastric tube cautiously introduced.

Twenty per cent of our cases sooner or later become diarrheic. This unpleasant complication could be cut short by treatment with opiates, acidol-pepsin, or sulfanilamides. Early cases usually react well to acidol-pepsin medication, but whether this was because or in spite of treatment I am unable

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* Read before the Sixth International Assembly of the International College of Surgeons, Rome, May 1948.

mal conditions, enhances vagal action which augments the motility and acid secretion of the stomach. If the vagal fibers are cut, this function is inoperative, and sympathetic block in the manner expected does not take place.

In 1938 I performed a splanchnicectomy on a patient with essential hypertension. Though the hypertension improved the patient suffered severe gastric pain and finally gastrectomy became necessary for duodenal ulcer which up to that time had been silent. When Ryan and van Hoy in 1946 reported "two deaths after subdiaphragmatic vagotomy" I recalled my own case which I had not understood too 'well at the time. The first case reported by these authors was one of duodenal ulcer combined with essential hypertension. Vagotomy was performed, followed in 13 days by sympathectomy on the right side. Fifteen days after the second operation the patient died, giving superficial signs of peritonitis. Necropsy revealed perforation of the`duodenal ulcer in the peritoneal cavity. The acute pain of the beginning perforation was completely obscured by removal of the sympathetic chain, an operation which, in my opinion, neutralizes the beneficial effect of the vagotomy. The title of the paper had obscured the physiologic facts.

The paper by Blegan and Kintner (1947) had a more accurate title: "Aggravation of Gastric Ulcer following Dorsolumbar Sympathectomy." Two case reports, which need not be quoted extensively, offer convincing evidence that extensive resection of the sympathetic nerve supply to the stomach will have a harmful effect on the clinical course of gastroduodenal ulcer. Here too the operation was performed for hypertension, but following operation such massive hemorrhage occurred that subtotal resection of the stomach had to be performed.

Sicard, Albot and coworkers showed in some cases that although sympathectomy relieves ulcer pain, roentgenographically the ulcer crater shows no evidence of healing.

In the light of these observations the question arises as to whether gastric and duodenal ulcer pain in the future will be treated by sympathetic block and whether such methods should not be rejected.

Vagotomy has brought to light new facts as to the balance between sympathetic and vagal function which will be of value in practical surgery. The value of the operation in itself will be decided in the future. In my opinion this operation, newly revived and animated by Dragstedt, will in time have a solid place in the surgery of peptic ulcer.

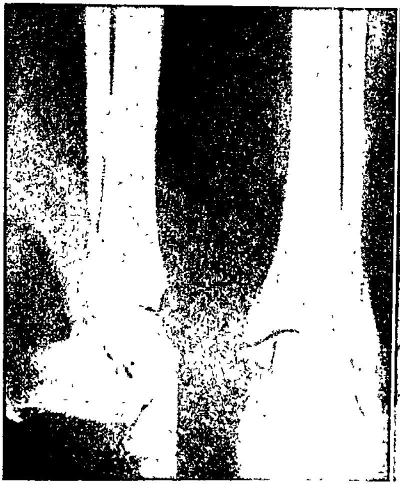

Fig. 1. Example of Type 1. Fresh fracture of the internal malleolus. Separation with outward rotation of distal fragment produced a "V" at the fracture site.

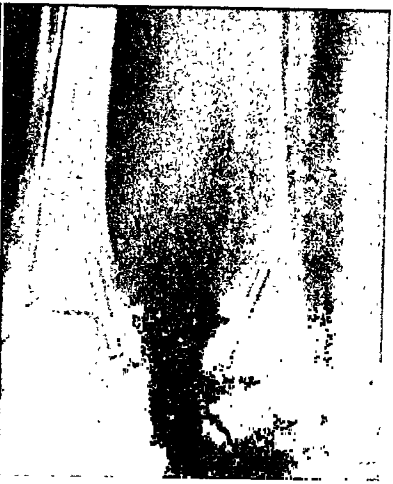

Fig. 2. Excellent result obtained by internal fixation with metal screw.

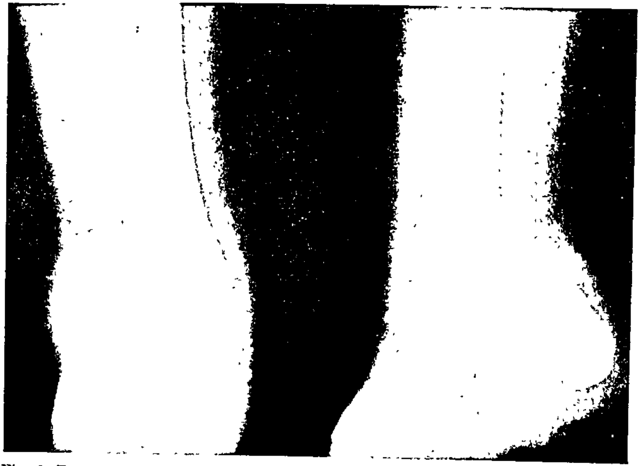

Fig. 3. Type 2, complex type. Example of failure of reduction in fracture of internal malleolus with skin complications.

Recent and Old Fractures of the Internal Malleolus

JAMES J. CALLAHAN, M.D., F.A.C.S., F.I.C.S.
CHICAGO, ILLINOIS

FRACTURES of the internal malleolus may be simple or complex. The simple fracture is without local soft tissue complications. "Complex" is a term recently popularized by Conwell[1] to designate simple fractures that are complicated by blebs, laceration, and excoriation of the skin.

Nearly all fractures of the internal malleolus are associated with fractures of the fibula. Some are complicated by tears or rupture of the tibiofibular ligament. The pathologic degree depends upon the site or location of the fracture and the kind and amount of force that produced the fracture.

This article is concerned only with those fractures in which a reduction is unsuccessfully attempted and those in which conservative treatment is necessarily prolonged because of skin complications. Three varieties of fractures of the internal malleolus will be explained, all of which have a common pathologic entity, namely, a displaced internal malleolus producing a "V" at the fracture site. Usually there are fibers of the transverse ligament stretching like a rubber band between the fragments or tendons to complicate the problem by preventing complete manual reduction. The transverse ligament can be removed only by surgery.

TYPES OF FRACTURES

Type 1. The first type consists of those fresh fractures of the internal malleolus in which the initial reduction under anesthesia proves unsuccessful (Fig. 1). I believe that in this type procrastination is dangerous and multiple attempts at manipulation should not be performed. On the contrary, in these immediate surgery is indicated. An excellent result (Fig. 2) can be obtained by internally fixing the internal malleolus with a metal screw as early as possible. By this procedure the ankle mortise is returned to normal. Excess callus formation is reduced to a minimum and few adhesions and complications are encountered. Following internal fixation plaster splinting for from eight to ten weeks is recommended. Intensive physiotherapy is helpful.

Type 2. The second type comprises those fractures of the internal malleolus complicated by skin conditions such as blebs, laceration, contusion, and excoriation. Immediate reduction is almost impossible but the attempt should be made. In this attempt the surgeon must always be mindful that the patient and the soft tissues must *receive* primary consideration.

General, not local, anesthesia should be employed. The skin should be cleansed and dressed, and either a plaster mold, or a pillow splint as advocated by Gurd[2] is used for initial immobilization after reduction.

In the case shown in Figure 3, an attempt to reduce the fracture was made under anesthesia after the skin had been cleansed as thoroughly as possible. The foot and leg were immobilized in a plaster splint. Postreduction roentgenograms, however, revealed failure of reduction (Fig. 3). It was necessary to wait seven weeks for the skin to heal completely before an open operation could be performed directly over the internal malleolus. The fragment was everted and held in this position by the transverse ligament. The operative procedure is as follows:

1. All soft tissue is removed.
2. The surfaces are freshened.
3. A small incision is made in the ligamentous attachments of the deltoid ligament at the inferior portion of the internal malleolus to permit the entrance of the drill preparatory to using the screw.
4. A screw is inserted in the drilled hole and the fragment internally fixed to the tibia (Fig. 4).
5. The ligaments are closed and the skin is sutured.
6. A posterior mold cast is applied above the knee which is in 30 degrees flexion. In the case shown in Figure 4 the cast was removed after 12 days.

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* Read before the Twelfth National Assembly, United States Chapter, International College of Surgeons, Chicago, Sept. 29–Oct. 4, 1947.

has been reduced correctly, the internal malleolus is internally fixed to the tibia by a screw through a hole previously drilled in the internal malleolus. Many times, as in the case shown in Figure 5, there is a gap or hiatus between the distal and proximal

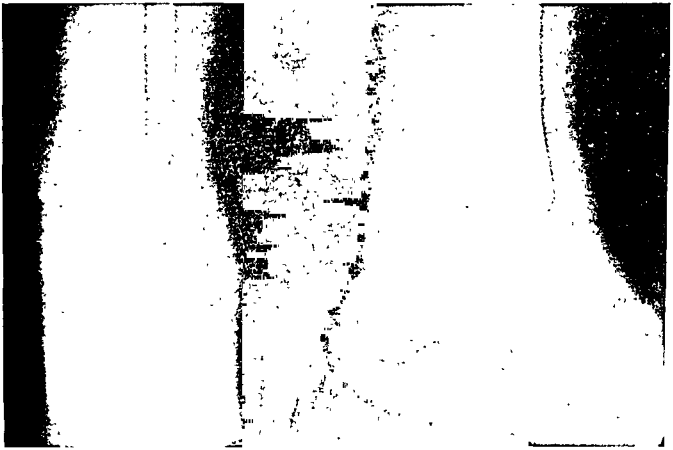

Fig. 5. Type 3. Unreduced fracture of the internal malleolus of five months' duration. Nonunion caused by soft tissue interposition, with absorption at fracture site.

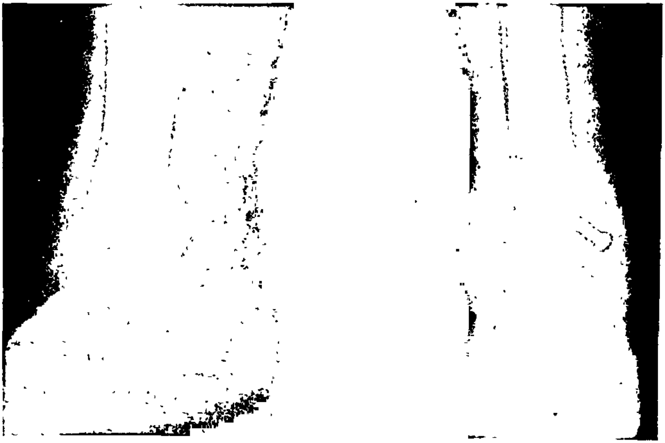

Fig. 6. Postoperative repair.

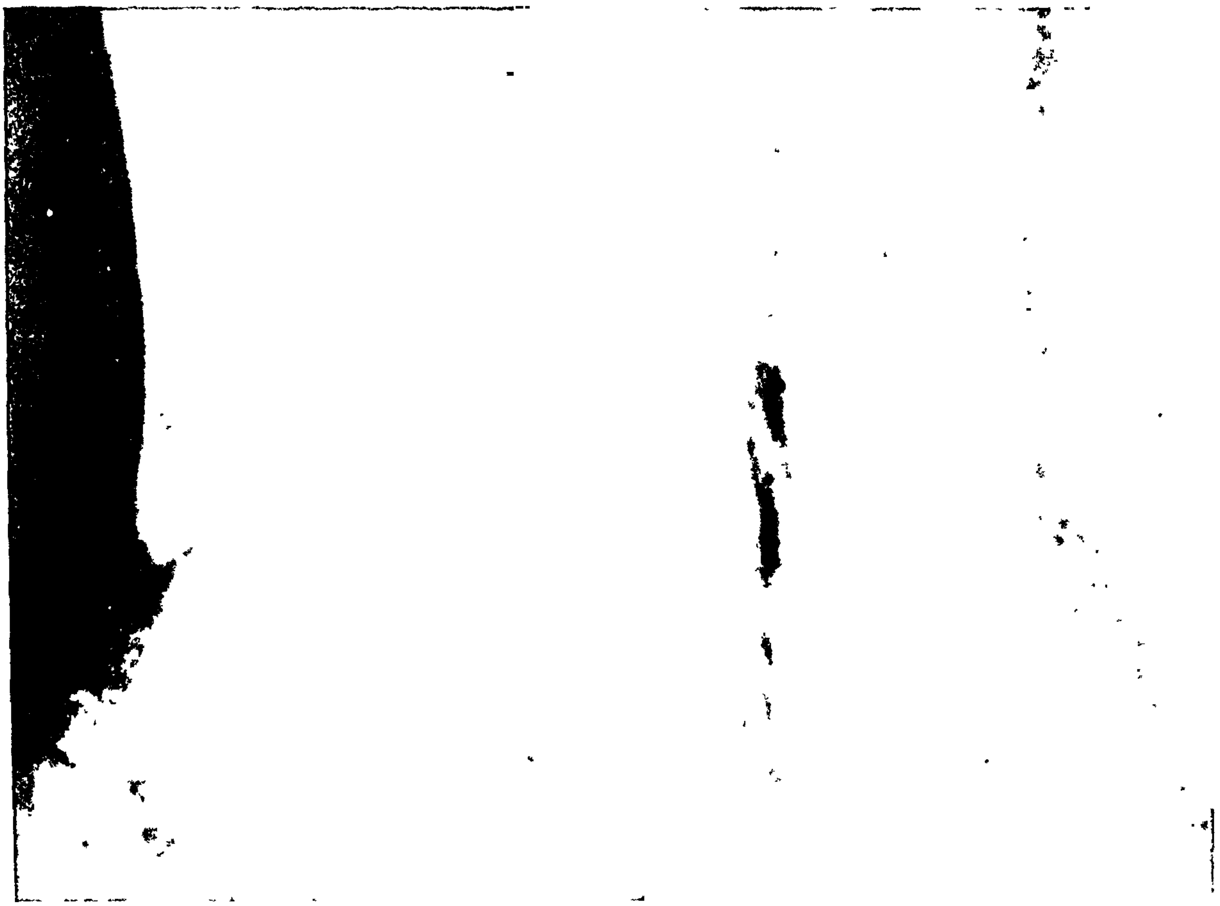

Fig. 4. Screw inserted in drilled hole for internal fixation of fragment to tibia. Fragment of bone removed from the tibia above the fracture site and inserted into the hiatus or gap at the fracture site.

7. The sutures are removed and a new posterior mold cast is applied above the knee. Now the posterior mold cast is circularized by plaster.

8. In the case illustrated, the second cast was removed after four weeks and another circular cast applied below the knee. The total period of immobilization in this case was four months.

Type 3. The third type, exemplified in Figure 5, is the neglected or unreduced fracture of the internal malleolus. The fracture illustrated was five months old. It had never been completely reduced, and there was nonunion because of soft tissue interposition. There was also absorption at the fracture site. Absorption always adds to the difficulty of reduction and immobilization.

If Type 3 fractures of the internal malleolus do not involve the stabilizing of the ankle mortise, the internal malleolus may be removed and the deltoid ligament sutured to the lower end of the tibia.

The operative procedure previously described is followed as well for the Type 3 fracture; that is, exposing the fracture site; removing all soft tissue from between the fracture surfaces; the use of an osteotome to secure good bone for approximation, and exploration of the ankle joint to remove panus formation and adhesions in order to secure anatomic reduction.

In most cases an osteotomy of the fibula will be required before complete reduction can be obtained. This can be performed through another incision over the fibula, exposing the original fracture site.

FIXATION OF THE INTERNAL MALLEOLUS

When all the fracture surfaces have been exposed and freshened, and when the ankle

Anterior Capsulectomy for Contractures of the Elbow*

PHILIP WILLNER, M.D.†
NEWARK, NEW JERSEY

An operation is being presented for the reconstruction of the elbow in which there is limitation of motion due to contracture of the anterior portion of the capsule. The results are good enough to warrant performance of this operation before undertaking more extensive procedures.

The improvement which may be expected is an increase in motion, mainly extension, of 25 to 45 degrees. The motions of the elbow joint necessary for adequate function are AGE-70 degrees to AGE-130 degrees.

Capsulectomy for the treatment of flexion deformity of the elbow has been described by Dr. Philip D. Wilson.[1]

In the present series, 8 of the cases were soldiers injured in combat by penetrating bullet or shrapnel, and 2 were adolescent patients in one of whom there was a malunited fracture of the elbow joint, and in the other a deformity following an operation for open reduction of an unreduced dislocation.

Surgery was performed only when all attempts at conservative therapy had failed. This consisted of plaster immobilization and supervised physical and occupational therapy.

The pathology of this deformity is an adhesive capsulitis of the elbow, a contracted anterior capsule, together with periarticular fibrosis. Therefore, it appears that improvement can be expected by excision of the periarticular fibrous adhesions and removal of all fibrotic portions of the capsular ligament of the joint. In practically all of the cases it was necessary to remove the entire anterior capsule.

The results to be expected from this surgical approach and technic are increased range of extension, increased range of flexion, maintenance of joint stability, and elimination of the possibility of surgical trauma to nerves whose anatomic positions have been altered by loss of or damage to the soft tissues.

ANATOMY

The elbow joint is a modified ginglymus joint. It is surrounded by ligaments so blended as to form a capsule which normally presents localized thickening in the form of bands. The anterior ligaments, attached above to the upper margins of the coronoid and radial fossa of the humerus and below to the coronoid process of the ulna and orbicular ligaments, present a well-marked, superficial band of obliquely directed fibers passing over the joint from the inner condyle of the humerus to the orbicular ligament. The internal lateral ligament, consisting of three diverging fasciculi, is attached at its apex to the inner epicondyle, the posterior band passing to the upper part of the coronoid process, the anterior to the inner side of the coronoid process, and the middle deeper band to the inner margin of the greater sigmoid cavity. The external lateral ligament is attached above to the external epicondyle and below to the ulna and orbicular ligament. The posterior ligament is attached above to the upper and lateral margins of the olecranon fossa and below to the olecranon process.

SURGICAL TECHNIC

A blood pressure cuff tourniquet inflated to 200 mm. Hg is used. A longitudinal incision, running proximal to the inner condyle of the humerus, is carried distally for approximately 2 inches. The ulnar nerve is identified and retracted. The inner epicondyle of the humerus is cut through with an osteotome and retracted, along with the origin of the flexor muscles. Careful elevation of the anterior structures then permits visualization of the medial aspect of the elbow joint. The medial half of the scarred, thickened anterior capsule is elevated by means of a periosteal elevator and dissected free from its bony attachments above and below. This is then excised. Periarticular adhesions are removed. The internal epicondyle is replaced and held in place by chromic catgut.

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*Presented at New Jersey Orthopedic Society Meeting, October, 1946.

† Diplomate, American Board of Orthopedic Surgery.

[1] J. Bone and Joint Surg., Jan., 1944.

fragments of the tibia. It is important to remove a fragment of bone from the tibia above the fracture site and insert the removed fragment and cancellous bone (Fig. 4) into the hiatus to promote a bony union and to prevent soft tissue from falling or forming between the fracture ends to cause nonunion. This method has been successful and bony union has occurred in every case treated in this manner.

The period of immobilization is necessarily prolonged because of the type of repair and fracture. Casts are worn for from 12 to 14 weeks. Intensive physical therapy and muscle reeducation are then instituted.

CONCLUSION

1. In fractures of the internal malleolus it is dangerous to accept as good enough a reduction that is neither adequate nor anatomic. Accurate reduction is important. Failure promotes painful ankles and feet, altered weight-bearing, and arthritic changes.
2. Procrastination in the surgical treatment of fresh fractures in which initial reduction is unsuccessful is ill advised, as the longer surgery is postponed, the more difficult is it to perform and the more uncertain are the end results.
3. Diastasis of the inferior tibiofibular joint should be corrected early, and immobilized long enough so that the scar connective tissue healing is complete. Otherwise, stretching or tearing will occur and favor displacement of the ankle mortise.

RIASSUNTO

1. Nelle fratture del malleolo interno e' pericoloso limitarsi ad una riduzione che non sia ne' anatomica, ne' perfetta. Occorre ottenere una riduzione perfetta: altrimenti permangono dolori a livello della caviglia e del piede, mentre si stabiliscono dei processi artritici.
2. Il procrastinare un intervento operatorio allorquando una frattura recente non e' stata bene ridotta rappresenta un errore, in quanto rende poi piu' difficile l'operazione a compromette il risultato finale.
3. Una diastasi dell'articolazione tibiofibulare inferiore va corretta precocemente ed immobilizzata fino allorquando si e' completata una solida cicatrice fibrosa. Altrimenti puo' stabilirsi una dislocazione dell' articolazione in seguito ad una lacerazione dei tessuti.

SUMARIO

Es peligroso en las fracturas del maleolo interno el aceptar como suficiente la reduccion que no es adecuada o anatomica. El fracaso en la reduccion favorece el dolor del pie, y hasta el artritismo.

La procrastinacion en el tratamiento quirurgico de las fracturas recientes en las cuales la reduccion no ha sido satisfactoria da mal resultado y hace mas dificil la intervencion en el futuro.

La diastasis de la articulacion tibioperoneal inferior debe de ser corregida tempranamente e inmediatamente se le debe de inmovilizar por suficiente tiempo de lo contrario se favorece el desplazamiento de la articulacion del pie

RÉSUMÉ

1. Il est dangereux dans les fractures de la malléole interne de se contenter d'une réduction qui n'est ni adéquate ni anatomique. Il importe de faire une réduction complète, car une réduction incomplète entraîne des douleurs de la cheville, du pied, interfèrent avec le support du corps et engendrent des troubles arthritiques.
2. Il ne faut pas retarder le traitement chirurgical des fractures récentes dans lesquelles la réduction initiale n'a pas été achevée. Il sera plus difficile d'obtenir de bons résultats si on retarde l'intervention opératoire.
3. La diastase de la jointure inférieure tibiofibulaire doit être corrigée. Le membre doit être immobilisé assez longtemps pour que l'union du tissu, cicatriciel et conjonctif soit obtenu; autrement, l'étirement ou la dechirure surviendront et favoriseront le déplacement de la mortaise de la cheville.

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Postoperative motion: On table—AGF 70 degrees to 160 degrees. Four months later—AGF 70 degrees to AGE 130 degrees. Improvement: 30 degrees in extension and 15 degrees in flexion.

Case 7. J. F., age 32, wounded in action June 15, 1944. Penetrating wound of right elbow with compound comminuted fracture of lateral condyle of right humerus. Immobilized in plaster for two months. Seven months of physical and occupational therapy with no increase in motion.

Preoperative motion: AGF 80 degrees to AGE 90 degrees.

Postoperative motion: On table—AGF 57 degrees to AGE 140 degrees. Two months later—AGF 57 degrees to AGE 105 degrees. Improvement: 15 degrees in extension and 23 degrees in flexion.

Case 8. A. M., age 25, wounded in action Dec. 6, 1944. Compound comminuted fracture of distal third of left humerus caused by shell fragments. Immobilized for two months in plaster. Four months of physical and occupational therapy with no increase in motion.

Preoperative motion: AGF 55 degrees to AGE 155 degrees.

Postoperative motion: On table—AGF 50 degrees to AGE 170 degrees. Three months later—AGF 55 degrees to AGE 140 degrees. Improvement: 25 degrees in extension.

Case 9. A. S., age 11, fell off coal bin in July, 1945, and sustained a fracture of external condyle of humerus. Was admitted to the Monmouth Memorial Hospital, Long Branch, New Jersey, for open reduction followed by physical and occupational therapy for one year without improvement.

Preoperative motion: AGF 95 degrees to AGE 155 degrees.

Postoperative motion: On table—AGF 55 degrees to AGE 175 degrees. Four months later—AGF 80 degrees to AGE 170 degrees. Improvement: 15 degrees in extension and 15 degrees in flexion.

Case 10. G. L., age 14, suffered fracture dislocation of right elbow Oct. 1, 1945. Was admitted to the Monmouth Memorial Hospital, Long Branch, N. J., for open reduction, followed by eight months of physical and occupational therapy with improvement during only the first four months of treatment.

Preoperative motion: AGF 90 degrees to AGE 120 degrees.

Postoperative motion: On table—AGF 40 degrees to AGE 180 degrees. Two months later—AGF 80 degrees to AGE 145 degrees. Improvement: 25 degrees in extension and 10 degrees in flexion.

It is realized that all of the pathology in flexion contractures of the elbow is not necessarily in the anterior portion of the capsule. In severe injuries about the elbow joint, there is a loss of muscle length or substance in the biceps and brachioradialis. These structures were not attacked operatively because it is felt that a biceps tendon lengthening or brachioradialis stripping would require too lengthy immobilization if maximum range of motion is to be obtained.

SUMMARY

1. An operation has been presented which will improve the range of motion, particularly in extension, where there is a flexion contracture.
2. All cases presented had received physical and occupational therapy, without improvement, for months before surgery was performed.
3. No complications, either vascular or neurologic, have been encountered after this operation.
4. All cases, with a single exception, have been improved by the operation and aftercare.
5. The follow-ups on these cases have been of short duration.
6. No immobilization is used.
7. Active motion within the tolerance of pain is started as soon as possible.
8. There has been an average improvement of from 30 to 45 degrees in motion, approximately 10 degrees of flexion and 25 degrees of extension.
9. It is felt that the average improvement warrants the recommendation of this procedure.

RIASSUNTO

Descrive un nuovo metodo operatorio onde accrescere—nei casi di contratture in flessione—l'ampiezza dei movimenti, specialmente di estensione. In tutti i casi operati la terapia fisica ed occupazionale era stata inutilmente tentata per mesi e mesi. All'operazione non sono seguite complicazioni vascolari o nervose.

A second incision is made on the lateral side of the elbow, proximal to the lateral condyle of the humerus and carried distally, approximately 2 inches, to the head of the radius. By careful elevation of the anterior structures, the lateral aspect of the elbow is visualized. The lateral half of the anterior capsule is removed by the same procedure as utilized on the medial half. The incisions are closed with interrupted cotton sutures. A compression dressing is applied consisting of sterile mechanics waste and an Ace bandage. The tourniquet is then released.

AFTER-TREATMENT

The compression dressing is not disturbed for three days, at which time it is removed. Active exercises are started four days postoperatively. On the seventh day, the sutures are removed and the active exercises are augmented with physical and occupational therapy.

The patient is encouraged to carry on active exercises but passive motions are not permitted. The carrying of heavy weights, hanging on a trapeze, and other forcible stretchings are forbidden. Occupational and physical therapy technics that stimulate normal function are encouraged. These are: weaving, printing, bookbinding, carpentry work, basketball, baseball, and calisthenics, together with many other sports and activities.

CASE REPORTS

Case 1. J. B. G., age 19, was wounded in action Aug. 10, 1944. Bullet entrance was on the dorsal, the exit on the volar aspect of the elbow joint. Immobilized in plaster to Sept. 21, 1944. Five months of physical and occupational therapy followed with no increase of motion.

Preoperative motion: AGF 90 degrees to AGE 105 degrees.

Postoperative motion: On table—AGF 60 degrees to AGE 150 degrees. Two months later—AGF 90 degrees to AGE 145 degrees. Improvement: 40 degrees in extension.

Case 2. W. L. S., age 22, was wounded in action Nov. 22, 1944. Shell fragment to left elbow. Immobilized in plaster to Jan. 2, 1945. Ten weeks of physical and occupational therapy resulted in 5 degrees increase in flexion and 5 degrees increase in extension.

Preoperative motion: AGF 85 degrees to AGE 100 degrees.

Postoperative motion: On table—AGF 55 degrees to AGE 165 degrees. Three months later—AGF 80 degrees to AGE 125 degrees. Improvement: 25 degrees in extension and 5 degrees in flexion.

Case 3. V. A., age 31, wounded in action Aug. 31, 1944. Bullet injury producing fracture compound comminuted complete humerus lower third. Immobilized in plaster to Nov. 12, 1944. Three months of physical and occupational therapy resulted in 10 degrees increase in flexion and 5 degrees increase in extension.

Preoperative motion: AGF 70 degrees to AGE 100 degrees.

Postoperative motion: On table not recorded. One month later AGF 70 degrees to AGE 128 degrees. Improvement: 28 degrees in extension.

Case 4. E. Z., age 19, wounded in action April 23, 1944. Penetrating shrapnel wound of left elbow with compound comminuted fracture distal third of left humerus. On May 7, 1944, open reduction and fixation of fracture. Eight months of physical and occupational therapy with no increase of function.

Preoperative motion: AGF 80 degrees to AGE 130 degrees.

Postoperative motion: On table—AGF 60 degrees to AGE 130 degrees. One month later—AGF 80 degrees to AGE 130 degrees. Improvement: None.

Case 5. T. H., age 20, fell from cargo net while going over obstacle course on Oct. 16, 1943. Sustained dislocation, compound, complete ulna and radius of left elbow and fracture compound comminuted of left coronoid process. Eleven months of physical and occupational therapy resulted in 5 degrees of improvement in extension.

Preoperative motion: AGF 60 degrees to AGE 105 degrees.

Postoperative motion: On table—AGF 45 degrees to AGE 160 degrees. Five months later—AGF 45 degrees to AGE 130 degrees. Improvement: 25 degrees in extension and 15 degrees in flexion.

Case 6. J. L., age 22, sustained compound comminuted supracondylar fracture right humerus. Treated by plaster immobilization plus skeletal traction. Three months later, cast and traction removed and physical and occupational therapy started. Three and a half months later, no increase of motion.

Preoperative motion: AGF 85 degrees to AGE 100 degrees.

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Case 7. J. F., age 32, wounded in action June 15, 1944. Penetrating wound of right elbow with compound comminuted fracture of lateral condyle of right humerus. Immobilized in plaster for two months. Seven months of physical and occupational therapy with no increase in motion.

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RIASSUNTO

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In un solo caso e' mancato un miglioramento. I movimenti attivi debbono essere iniziati al piu' presto dopo l'intervento, naturalmente nei limiti della dolorabilita'. L'ampiezza dei movimenti viene cresciuta, in media, di 30' 45°: approssimativamente di 10° nella flessione, di 25° nell'estensione.

Questi risultati giustificano l'adozione del nuovo metodo operatorio.

SUMARIO

Se describe una tecnica operatoria en el tratamiento de las contracturas en flexion que facilita el mayor movimiento especialmente en la extension. Todos las casos que se han presentado fueron tratados previamente con la fisioterapia y occupacionalmente por varios meses antes pero sin resultados favorables. Ningun caso operado por esta tecnica han presentado complicaciones vasculares o neurologicas. Todos los caso con una sola excepcion obtuvieron cirte mejoria. Post operatoriamente se estimulan los movimientos activos hasta el limete de tolerancia del paciente al dolor. La mejoria presenta un averaje de 30 a 45 grados en la mocion, 10 grados en la flexion y 25 grados en la extension; lo cual justifica el uso de esta tecnica.

RÉSUMÉ

Une operation a été presentée qui améliore l'étendue du mouvement, surtout l'extension quand il existe une contracture de la flexion. Tous les cas presentés avaient été soumis à un traitement physique et occupationnel pendant des mois et aucune amelioration n'avait été obtenu amelioration avant qu'on intervienne chirurgicalement. Après l'opération ainsi recommendée, il n'y eux aucune complication vasculaire ou neurologique. Tous les cas sans exception bénéficièrent de l'opération et des soins postopératoires. On n'a pas suivi ces cas pour une longue durée. On n'eut pas recours à l'immobilisation. On commenca aussitôt que possible les mouvements actifs limites seulement par la tolérance du malade à la douleur. On a obtenu en moyenne une amélioration de 30 a 45 degrès en mouvement, approximativement 10 degrès en flexion et 25 degrès en extension. Le resultats justifient l'emploi de cette méthode.

Infections of the Extremities

CARROLL J. BELLIS, M.D., F.A.C.S., F.I.C.S.*
LONG BEACH, CALIFORNIA

INTRODUCTION

ADAMI[1] characterized inflammation as the reaction of irritated or damaged tissues which still retain vitality—essentially a process of adaptation of the organism. It consists of a series of local changes manifesting the attempt at repair of actual or referred injury to a part. Cohnheim[2] considered inflammation to be a process reducing the harmful consequences of injury, and Opie[3] defined inflammation as a method by means of which cells and serum accumulate about an injurious substance to remove or destroy it. Excellent descriptions of the inflammatory process have been recorded (Borst[4]; Brücke[5]), and each observer has attempted to rationalize the clinical and microscopic appearance of the inflamed tissues on the basis of the underlying histology. Virchow emphasized that the increased metabolism of the inflamed area paralleled the increased nutritive demands of the involved tissues.

William Harvey[6] noted the many circumstances which altered the blood flow, and explained the inflammatory process primarily as a result of capillary dilation. Using a plethysmograph with photographic recording, Burton[7] showed that from full constriction to full dilation there was an increase in blood capillary flow from 5 cc. per minute per 100 Gm. of tissue to 50 cc. per minute per 100 Gm. of tissue.

Although Bayliss[8] and Gaskell[9] had shown that carbon dioxide is a capillary dilator, Findlay[10] stated that histaminelike substances liberated at the point of injury effected a local dilation of the small vessels and arterioles and an increased permeability of the vessel walls. The same conception has been held by others (Loos[11], Moon[12], Ebbecke[13], Dale and his colleagues[14], Atzler and Lehmann[15], Grant[16], Barcroft *et al.*[17]). Harris[18] showed that vasodilation in the submaxillary gland may be produced by the collection of metabolites and that the production of osmotically active substances greatly increases filtration.

Although Ricker and Regendanz[19] had maintained that the capillaries in inflammation are not more permeable than normal and that the composition of the edema fluid could be explained by increased intracapillary pressure, other observers insist that the capillaries are rendered highly permeable during inflammation (Török, Lehner, and Kenedy[20]; Adlersberg and Perutz[21]). Some investigators have explained the apparent increased permeability as being due to capillary stasis (Florey[22]; Gelpke[23]) and opening of arteriovenous anastomoses (Gerard[24]; Clark and Clark[25]; Popoff[26]), with establishment of a greater capillary bed (Martin, Woolley, and Miller[27]).

The papers of Sir Thomas Lewis and Grant[28] record their experiments upon capillary reactivity, particularly in regard to wheal formation. In the words of Lewis, ". . . there exists in the skin a single and organized mechanism of defense against injury of all kinds and . . . the agent which alarms the garrison and mobilizes the first forces of this defense is a chemical agent derived from the tissues . . . being independent of higher centers of organization (nervous) and of distribution (vascular)."

DIAPEDESIS

With the dilation of capillaries in the inflammatory field and the subsequent slowing of the stream, margination and emigration are coincident phenomena. Arnold[29] insisted that diapedesis took place through preformed stomata in the capillary wall. The French school strongly believed that diapedesis was an active process induced by contact of the capillary wall with bacteria or their products (Bouchard[30]; Charrin and Gamaleia[31]; Dutrochet[32]). Fischer[33] led a group which held that capillary stomata do not exist. He showed that erythrocytes could pass through gelatin by gravity or pressure without leaving apertures or other traces, just as mercury will pass through solidified gelatin.

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* Diplomate of the American Board of Surgery.

Although it had been known that dead or living bacteria or their products were strongly chemotactic (Gabritchevsky [34]; Massart and Bordet [35]; McCutcheon, Dixon, Mudd, and Lucké [36]), it was not until the studies of Falk and his coworkers [37] that the electrophoretic potentials of bacteria and leukocytes were quantitated.

Abramson [38] was the first to quantitate the intimate relationships between the electrostatic charges on the blood cell surfaces and that on the capillary walls. His brilliant papers on the alteration of electrostatic charge induced by inflammation should be reviewed by every student of the subject. Briefly (Bellis and Scott [39]), it appears that, under normal conditions, blood cells and capillary membranes possess a negative charge (thermodynamic and electrokinetic potentials). In inflammation, the potential on the capillary wall is reduced, causing attraction of leukocytes (margination); diapedesis results from the increased potential difference between the colloidal micelles in the tissue spaces and the leukocytes. Both the thermodynamic and electrokinetic potentials on the leukocyte are greater than on the erythrocyte because of the greater size of the leukocyte; hence, a much greater reduction of potential on the capillary wall is necessary to produce margination and migration of erythrocytes. In severe inflammations even this takes place. The studies by Knisely and his colleagues [40] suggests that the sludging of blood is related directly to these surface phenomena.

PERMEABILITY OF CAPILLARIES TO PROTEIN

Although normally the glomerular ultrafiltrate is protein-free (Wearn and Richards [41]), the capillary wall in other parts of the body is permeable to protein (Drinker and Field [42] Cavett [43]; Concklin [44]; Magnus [45]; Erlanger [46]; Churchill, Hakazawa, and Drinker [47]; Peters [48]; Scott [49]; Bayliss *et al.*[50]; Böhm [50]).

Lymph formation and the character of exudates have been submitted to extensive investigation, and Meyer [51] has discussed adequately the origin and removal of edema fluid. Generally, it is conceded that subcutaneous lymph and plasma are nearly identical in chemical composition except for the concentration of proteins and substances (phosphorus and calcium) combined with protein (Heim [52]; Underhill *et al.*[53]; Drinker and Field[42]). Subcutaneous lymph in the human has been found to contain as high as 3.5 per cent protein (Munk and Rosenstein [54]), the albumin-globulin ratio being the same as that in the corresponding blood plasma.

The fibrinogen content of blood plasma in acute infections is increased markedly (Rusznyak, Barat, and Kurthy [55]; Starlinger [56]; Senator [57]), and this may account for the gelatinous matrix of the inflammatory field (Baitsell [58]). This exudate, when rendered cell-free, is far more bactericidal than is the blood serum of the same animal, but it appears that the leukocyte products are largely responsible for this activity (Buchner [59]; Denys and Havet [60]).

REGIONAL LYMPH FLOW

In the horse, a volume of lymph equal to that of the blood may be obtained in 24 hours (Delamere [61]). Starling [62] showed that in order to get any lymph at all for study in the normal animal, one must knead or passively move the limb. This maneuver probably increases the protein content so that "normal" figures are inaccurate. In edematous tissues, however, the connective tissue tends to keep the lymphatics open so that a greater lymph flow occurs, the oncotic pressure of the blood opposing the capillary filtration pressure. Exercise, heat, and inflammation increase the lymph flow and pressure (McMaster *et al.*[63]); in fact, in the presence of mild inflammation, lymphatics will permit the diffusion of otherwise indiffusible dyes through their walls.

From the clinical standpoint it is interesting that Parsons and McMaster [63] discovered *that pulsatile perfusion of blood vessels in the* rabbit ear increased the rapidity of lymph flow 15 to 20 times that observed when constant blood pressure was applied, despite the fact that in many instances less blood flow per gram of ear occurred. Edema sometimes developed during the course of a pulsatile transfusion, concurrent with an enormous increase of lymph flow, although the volume of blood perfused was relatively small.

Although antibiotics and sulfones are important in the stemming of spreading infection, there has yet appeared no immunologic agent to unburden the surgeon of his struggle with this type of condition. As Wangensteen[64] has pointed out, the surgeon has learned that incision of extending areas of phlegmon and cellulitis does not stem the spread of infection—that, in fact, such procedures do harm. Whether such an infection be in the soft tissues of the arm, leg, brain, or lung, the surgeon must restrain himself and support the natural defenses of the body, withholding actual surgical intervention until signs of localized suppuration are evident. Only then should drainage be established.

Formerly, therapy was directed at reduction of the effects of inflammation, but more recently it has been suggested that the accompanying swelling was useful and assisted in localizing the infection, diminishing the tendency to centripetal spread. Mindful of this, Bier[65] sought to increase the heat and swelling attending infection by application of heat, by obstructing the venous return, and by cupping. Noetzel[66] believed that a current of tissue fluid was established by Bier's hyperemia, the fresh transudate being bactericidal and the hyperemia stimulating fibrosis. Undoubtedly, the inflammatory exudate possesses immunologic properties; yet the impression can not be avoided that tense edema is harmful.

POSITION AND VOLUME CHANGES IN THE HUMAN

Quiet standing leads to hemoconcentration, characterized by increase in the specific gravity of the blood and plasma and decrease in circulating blood volume (Böhme[67]; Harrop and Waterfield[68]; Thompson, Thompson, and Daily[69]; Youmans *et al.*[70]). Venous congestion has been shown to have a similar effect (Yamaguchi[71]; Stewart[72]; Rowe[73]; Plass and Rourke[74]; Reiss[75]). Piorry[76], who described the influence of gravity as an impediment to circulation in the standing position, was the first to demonstrate that the venous and capillary circulation is influenced by position, that it is gravity that causes veins to swell when the arm is dependent, and that gravity is responsible for hypostatic pneumonia.

It is not surprising, therefore, that attention has been directed by many observers to the increase in volume of an extremity when it is dependent or when the venous return is partly or entirely occluded (Atzler and Herbst[15]; Stead and Kunkel[77]; Hamilton, Lichty, and Pitts[78]; Wells *et al.*[79]; Waterfield[80]; Bolton[81]; Mende[82]; White and Jones[83]; Drury and Jones[84]). Mosso, using a delicate balance board, found that when a subject assumed the horizontal position after standing for some time, the weight of the feet end of the board only slowly decreased, in spite of the fact that the excess blood leaves the lower extremities almost immediately.

CAPILLARY BLOOD PRESSURE

Any study of inflammation must, of necessity, consider the vacillating capillary pressure, the determination of which is delicate work. Capillaries in the living individual have been described adequately by many observers (Boas[85]; Abderhalden[86]; Redisch[87]; Bardley, Graw and Sherman[88]; Thaller and Draga[89]; Stegemann[90]; Schur[91]; Sehrt[92]; Parrisius and Winterlin[93]; Roy[94]; Niekau[95]; *Neumann*[96]; *Magnus*[97]; Weiss[98]; **Elliott**[99]; Grosser[100]; Heimberger[101]; Sheard[102]; Florey[22]; Herzog[103]; Popoff[26]), but the determination of their intraluminal pressures has defied investigators until quite recently. The blanching pressure (von Recklinghausen[104]; van der Spek[105]; Carrier and Rehberg[106]) and the pressure required to stop bleeding (Basler[107]) are inaccurate methods since occasionally they give values lower than venous pressure in the same individual (White[108]). The figures so obtained are probably the pressures required to empty the subpapillary venous plexuses (Danzer and Hooker[109]). The pressure necessary to prevent wheal formation (Adlersberg and Perutz) also gives an abnormal reading. The slightest variations in the surroundings may lead to remarkable changes in the diameter of a capillary and in its pressure (Reisner[110];

Ellis and Weiss[111]; Ershler[112]); in fact, capillary pressures ranging from 1.5 to 71 mm. Hg have been recorded as normal (Strax and de Graff[113]). Using the method of Lombard[114] and of Landis[115], micropipets can be drawn from fine glass tubes and capillary cannulation accomplished with the Chambers micromanipulator[116].

PHYSICAL FACTORS IN INFLAMMATION

It has been shown (Bellis[39]) that, with the upper extremity in the horizontal position, the radial systolic blood pressure is about 30 mm. Hg higher than in the elevated position and, with the extremity dependent, about 45 mm. Hg higher than in the elevated position. There is an increase of 15 to 20 mm. Hg when the extremity is brought from the horizontal to the dependent position. Concomitantly, it can be shown that, after elevating the upper extremity perpendicular to the horizontal trunk for an hour, the skin surface temperature of the fingertip becomes 4° or 5° C. lower than when in the horizontal position. A similar decrease in temperature can be demonstrated after elevation of the lower extremity at 60° with the horizontal. On the other hand, after 12 hours in the semi-Fowler position, the skin surface temperature of the lower extremity increases 3° or 4° C.

In normal patients, the subcutaneous tissue tension on the dorsum of the hand averages about 2 mm. Hg. The subcutaneous tissue tensions found in inflammations are always higher than normal, the distensibility of the tissues tending to limit capillary filtration (Beecher[117]). In the region of acute fractures, the tissue pressures range from 8 to 16 mm. Hg. After immobilization, the tissue pressures drop remarkably. A similar increase of tissue pressure may be demonstrated in miscellaneous types of inflammation.

During the day there is an increase in volume of the lower extremity of from 500 to 800 cc. (Bellis[39]). Expressed as increase per 100 cc. of extremity, the increases have been found to range from 0.5 cc. per 100 cc. of extremity to 7.3 cc per 100 cc. of extremity. These increases amount to from 2 to 7 per cent of the leg volume In infections of the lower extremity, an increase of 4500 cc. in volume has been observed over that in the corresponding normal extremity. After elevation of the infected extremity, the volume rapidly diminishes, the most rapid decrease occurring in the first few hours.

In inflammations of human upper or lower extremities, the skin surface temperatures may increase as much as 7° C. At the same time, the specific gravity of the edema fluid ranges from 1.019 to 1.030, corresponding to protein contents of 4.1 to 7.9 per cent. In experimental inflammations in cats and rabbits, it has been shown that the protein in the vesicle fluid may be 4 to 6 per cent, approximating plasma protein levels (Drinker and Field[42]). In these areas, the subcutaneous tissue tension may be elevated to 28 mm. Hg, the control tissue tensions being 0 to 2 mm. Hg. The capillary pressures rise from a control of 22 mm. Hg to 40 mm. Hg in the inflamed areas. Increases of extremity volume as great as 65 cc. have been observed in these small animals.

CLINICAL APPLICATIONS

Hilton[118] wrote a fascinating and informative treatise on rest and pain in which he stressed the importance of rest in the treatment of infections. Those skilled in the treatment of tuberculosis will attest to this fact. A short time later, Dennis[119] pointed out the value of immobilization in plaster in the treatment of compound fractures, and Orr[120] adopted rigid immobilization in plaster as a sequel to sequestrectomy for chronic osteomyelitis, shortly thereafter employing closed plaster encasements and massive vaseline packs after extensive osteotomy in acute osteomyelitis.

The essential treatment of acute infections of the extremities should be (a) rest by rigid immobilization of the extremity (if necessary, a plaster encasement, including the trunk, may be employed), and (b) elevation of the affected member in such a manner as most rapidly to drain the edema fluid toward the heart by gravity. If a plaster encasement is used, appropriate openings should be made to permit frequent observation of the infected area. When there is evidence of suppuration, a small incision is made for evacuation of the exudate through the window. Large incisions have no advantage, producing only more trauma to tax the patient's already burdened healing powers.

The only type of case in which early incision is warranted is acute tenosynovitis. In such cases, the necessity of early opening of the tendon sheath to preserve the nutrition and identity of the tendon has been pointed out by Kanavel.[121] For a similar, but not identical reason, opening of an anterior closed space infection is necessary *before* suppuration occurs.

The immobilization which can be secured by a plaster encasement is more efficient than that obtained by any other method. Sandbags, traction, voluntary rest, and other measures do not offer the relaxation and rest to an inflamed extremity rendered by an adequate plaster encasement. At the University of Minnesota Hospital, in the treatment of infections of extremities in 116 patients, good results (rapid control of the infection with healing) were obtained in 72.2 per cent; fair results (control of the infection with delay or recurrence) were obtained in 21.6 per cent; poor results (uncontrolled infections) were seen in 6.0 per cent.

INFLAMMATION AND PAIN

Inflammation is in large part a reflex act initiated by pain (Odermatt [122]; Rosenbach [123]; Ricker and Regendanz [19]). Spiess [124] emphasized that anesthetized wounds underwent less inflammation, and that a direct relationship existed between anesthesia and healing. He noted that the more painful a wound the more it became inflamed. If the pain was removed by means of a local anesthetic, the inflammation diminished to an extraordinary degree. Thus, he advocated the use of local anesthetics to abolish or reduce inflammation in the eye, nose, and throat, a teaching which is followed today.

Bruce [125] showed that conjunctival anesthetics prevented experimental inflammation, that the initial vasodilation in inflammation is an axon reflex, and that the development of edema is dependent upon the integrity of the axon reflex. In his experiments, he used alypin, a local anesthetic, to prevent mustard oil inflammation in the eye. Bardy [126] advocated the use of morphine to reduce inflammation and stated that "dolor" was responsible for "turgor," "rubor," and "calor."

INFLAMMATION AND REST

Beecher [117] demonstrated the marked lymph flow attending muscular activity. Since the lymphatic channels through which infection spreads lie in the fascias between the muscles, decrease of muscle movement by immobilization serves to minimize dissipation of the infection, and is an important factor in aiding *the natural defenses of the body in localizing* the infection.

Adler and Meltzer [127], speaking of tissue fluid, wrote, "The fluid spreads with more or less ease from one lymph space to another, the propelling forces being diffusion and mechanical pressure. The latter is caused, first, by contracting the muscles surrounding the lymph spaces, and, second, by gravity and external mechanical pressure (massage)." The excellent work of McMaster, Hudack, and Parsons [63] illustrates the readiness with which the gentlest massage increases lymph flow.

The harmful effects of heat in the presence of inflammation has been emphasized by Allen [128] and by Samuel [129]. It is well known that heat increases formation of tissue fluid (Freeman [130]; Amitin [131]; Drury and Jones [64]; Castellani [132]; Hewlett and van Zwaluwenburg [133]). Owing to local vasodilation, much more heat than in a homologous normal area is present in an inflamed area, resulting in an excess production of edema fluid. Heat promotes filtration through the capillary wall. This produces an increase of tissue pressure which compresses venules and elevates venous pressure. Simultaneously, capillary pressure is increased, the filtration of fluid through the capillary walls into the tissue space of an inflamed area being a product of the increased intracapillary pressure and the increased permeability of the capillary wall due to the inflammation and the heat. The tissue pressure opposes this filtration. It is doubtful if heat is a therapeutic adjuvant in the treatment of inflammation. If any therapeutic temperature change would be desired, the application of cold may be better, although heat is analgesic.

EFFECT OF ELEVATION

Elevation of an inflamed part diminishes the edema and venous pressure and reduces its temperature. Because the capillary wall is much more permeable to protein, which escapes into the tissue spaces, edema can be removed only partly by elevation. Since a diminished transudation of fluid is effected by elevation and by the introduction of the effect of gravity on blood flow and on the edema already formed, elevation definitely reduces the tissue tension and volume of the extremity. Friedrich [134] taught that the rising tissue pressure compressed capillaries and caused gangrene.

Thus, the sitting or standing position is indicated for infections of the head and neck, and the Trendelenburg position for pararectal, scrotal, pelvic, and lower abdominal inflammations. Carrier and Rehberg showed that when the hand is above the heart, capillary pressure is low, and when dropped below, the increase of capillary pressure is almost identical with the theoretic increment due to the hydrostatic pressure of the column of the venous blood. Koch [135] and Mason [136] have advocated compression dressing of the elevated inflamed hand to secure pressure on veins.

RELATION BETWEEN CAPILLARY PRESSURE, PLASMA ONCOTIC PRESSURE, TISSUE TENSION, AND TISSUE ONCOTIC PRESSURE

Graham,[137] who first used the term colloid, mentioned that plasma colloids might exert an osmotic pressure in the blood. After Starling's demonstration of the colloid osmotic pressure developed by the plasma proteins, Schade and his coworkers [138] showed that, in inflammation, especially in suppuration, the osmotic pressure of the tissue fluid may be as high as 11 atmospheres. They believed, therefore, that inflammatory edema was nearly entirely an osmotic phenomenon, but gave proper importance to the tissue tension. Burch and Sodeman [139], however, showed that the tension in developing edema was unusually high due to the "tone" of the connective tissue. Landis has shown that the blood pressure at the arteriolar end of the capillary loop is about 45 cm. water, that the pressure at the venous end is 22 cm. water, and that the colloid osmotic pressure of the blood is 35 cm. water. Thus, there is a tendency for ultrafiltration at the arterial end and to resorption of fluid at the venous end of the loop.

That this ideal system operates only under "normal" conditions is well accepted (Youmans [70]; Smirk [140]; Fahr [141]; Krogh, Landis and Turner [142]; Field and Drinker [42]). In inflammation or venous engorgement, there is outpouring of filtrate into the tissue spaces. Some investigators have even assumed that a linear relationship exists between the rate of edema formation and the difference between capillary pressure and the osmotic pressure of the plasma proteins (Moore [143]; Weech, Goettsch, and Reeves [144]; Bazett [145]).

The factors influencing the local formation of edema have been subjected to rigid investigations by competent observers, and it appears that the primary factors are (1) elevated capillary pressure, (2) lowered colloid osmotic pressure of the blood plasma, (3) damage to the capillary wall, and (4) lymphatic obstruction. Contributory factors are (5) low tissue pressure, and (6) warmth. Krogh laid great stress on the intracapillary pressure, while Schade believed that the two most important balancing factors are the tissue tension ("Gewebsspannung") and the imbibition pressure of the interstitial colloids ("extracelluläre wasserdurchtränkte Bindegewebskolloid").

The high protein levels of inflammatory edema fluid may be equivalent to a colloid osmotic pressure of 40 cm. water (von Farkas [146]; Govaerts [147]). Therefore, the tissue fluid may raise the osmotic pressure on the outside of the capillary to such a level that resorption of fluid by the capillary through osmotic means may be slowed greatly or become impossible.

Fahr stated that the sum of serum protein osmotic pressure and tissue tension need not equal the sum of edema fluid osmotic pressure and intracapillary pressure except during equilibrium. If fluid is leaving the capillary, the hydrostatic capillary pressure will be so high that the sum of capillary pressure and edema fluid osmotic pressure will be greater than the sum of the forces retaining fluid in the capillary.

As an example, the following equilibrium, in terms of millimeters of mercury, was found to be established in experimental inflammation:[42]

(a) pulling into blood.
18 mm. Hg (6% plasma protein) + 31 mm. Hg (tissue pressure) = 49 mm. Hg

(b) pulling into tissues:
12 mm. Hg (4% edema fluid protein) + 40 mm. Hg. (capillary pressure) = 52 mm. Hg

It has been observed clinically that elevation, rigid immobilization, and avoidance of heat accelerate the healing of infection and are accompanied by striking relief of pain. In the last few years, therefore, immobilization and elevation of infected extremities have been employed as the primary treatment in a number of acute phlegmonous infections, among which have been cases of infection of joints, bones, and soft tissues. The impression has been gained that this method of treating joint infections, when accompanied by proper incision to afford dependent drainage of abscesses, is far superior to the method of active mobilization. Usually, the results attending its use in infections of the soft tissues are superior to those obtained by other means. Surgeons must give an increased amount of attention to the physical factors in inflammation. Undoubtedly, bacterial products despoil tissues, but a great part of continuous inflammation is due to the compression effect of edema upon the venules. Immobilization reduces the oxygen required by muscle, and elevation, by reducing edema, with the attendant increased capillary blood flow, may abort infection and prevent suppuration.

CONCLUSIONS

1. Blood flow in an extremity is influenced by position of the latter, elevation reducing the arterial systolic pressure and skin surface temperatures, an increase of these values being observed during dependency.

2. The edema fluid pressure in experimental inflammation rises rapidly to the level of capillary blood pressure. The edema fluid in inflamed extremities of patients usually is under a tension higher than the venous pressure and often higher than midcapillary pressure. Thus, there develops an elevation of tissue tension 10 to 20 times that of normal. This tends to increase formation of edema fluid.

3. Immobilization and elevation reduce the tissue tension of an inflamed extremity.

4. The elevated skin surface temperature of an inflamed extremity parallels the greater blood volume flow.

5. Gravity may increase the leg volume 2 to 7 per cent during the day. In inflammation of an extremity the volume may be increased 50 per cent.

6. The increased volume of an inflamed extremity can be reduced markedly by elevation.

7. The protein content of edema fluid from inflamed extremities in patients and experimental animals approximates the blood plasma level.

8. Capillary blood pressure is increased in the inflammatory site so that the following equilibrium is approached:

> Plasma oncotic pressure + capillary pressure = tissue oncotic pressure + tissue pressure.

The factors on the left, however, are preponderant, resulting in a continuous tendency toward edema formation.

9. Clinical trial suggests that immobilization and elevation are adjunct measures of distinct value in supporting the natural defense mechanism of the body in infections of the extremities. Their use appears to rest on a rational physiologic basis. The application of heat under these circumstances appears to be harmful.

SUMARIO

1. La circulacion de la sangre en una extremida es unfluenciada por su posicion. Su ele-

vacion reduce la presion sistolica arterial y la temperatura de la superficie de su piel. Estos valores aumentan durante su dependencia.

2. La presion del edema en las inflamaciones experimentales aumenta rapidamente hasta que llega al nivel de la presion capilar. La tension del edema en extremidades inflamadas is mayor que la presion venosa y muchas veses mayor que el de la presion midcapilar. Esto resulta en la elevacion de la tension en los tejidos de 10 a 20 veces mas de lo normal y favorece la formacion del edema.

3. La elevacion y la inmovilizacion reducen la tension de los tejidos en una extremidad inflamada.

4. La elevacion de la temperatura de la superficie de la piel de una extremidad inflamada paralelisa el aumento del volumen de la circulacion de dicha extremidad.

5. La gravedad aumenta el volumen de la pierna de 2 a 7 por ciento durante el dia mientras que la inflamacion lo puede aumentar hasta un 50 por ciento.

6. El aumento del volumen de una extremidad inflamada puede reducirse grandemente elevando dicha extremidad.

7. La tara proteica del edema de una extremidad inflamada de aproxima al del plasma de la sangre.

8. La presion capilar de la sangre aumenta en el sitio inflamado de tal manera que el siguiente equilibrio existe: La presion oncotica del plasma-presion capilar—presion oncotica del tejido—presion del tejido. Los factores de la izquierda son preponderantes, resultando una tendencia continua hacia la formacion del edema.

9. Clinicamente esto sugiere que la inmovilizacion y la elevacion son medidas terapeuticas de gran valor en el tratamiento de las infecciones de las extremidades. Su uso aparece ser racional y fisiologico. La aplicacion del calor bajo estas circumstancias es aparentemente danino.

RIASSUNTO

1. La circolazione del sangue negli arti e' influenzata dalla loro posizione. L'elevazione riduce la pressione arteriosa (sistolica) e la temperatura cutanea: l'abbassamento degli arti produce l'effetto inverso.

2. Nei processi infiammatori indotti sperimentalmente la pressione del liquido edematoso aumenta rapidamente, cosi da raggiungere quella della circolazione capillare. Negli arti infiammati la pressione del liquido edematoso e' generalmente maggiore della pressione venosa e spesso anche della pressione capillare. La tensione dei tessuti aumenta percio' da 10 a 20 volte quella normale, favorendo in tal modo lo sviluppo di edemi.

3. L'immobilizzazione e l'elevazione diminuiscono la tensione dei tessuti a livello della zona infiammata.

4. La temperatura cutanea segue parallelamente l'aumentato afflusso di sangue.

5. La forza di gravita' puo' aumentare, durante la giornata, da 2 a 7% il volume della gamba. Quando si stabilisce un processo infiammatorio l'aumento puo' raggiungere il 50%.

6. L'aumento di volume puo' essere notevolmente ridotto dall' elevazione della gamba.

7. Nei processi infiammatori naturali o sperimentali il liquido edematoso contiene una quantita' di protiene quasi equivalente a quello del plasma.

8. Nella zona infiammata la pressione capillare aumenta cosi da stabilire il suguente equilibrio: pressione oncotica del sangue—pressione capillare—pressione oncotica dei tessuti—pressione tissulare.

9. L'esperienza clinica dimostra che l'immobilizzazione e l'elevazione rappresentano delle misure terapeutiche molto importanti nel coadiuvare i meccanismi di difesa dell' organismo nelle infezioni delle estremita'. L'applicazione di calore appare invece dannosa.

RÉSUMÉ

1. La circulation sanguine d'une extremité est influencée par la position du membre: l'élévation réduisant la pression artérielle systolique et la température de la surface cutannée; si le membre est dépendant, on observe une augmentation de ces valeurs.

2. Dans l'inflamation expérimentale la pression du fluide, l'édémateux augmente rapidement et atteint le niveau de la pression sanguine capillaire. Le fluide de

l'édeme dans les extremités enflammées des malades a généralement une tension superieure á la pression veineuse et souvent a la pression mid-capillaire. Ainsi se développe une elevation de la tendon des tissus 10 a 20 fois au-dessus de la normale. Cela a une tendance à augmenter la formation des fluides oedémateux.

3. L'immobilisation et l'élévation réduisent la tension tissulaire dans une extrémité enflammée.

4. L'élévation de la température cutannée d'une extremité enflammée est augmentée avec un plus grand rapport sanguin.

5. La gravité peut augmenter le volume de la jambe de 2 a 7% durant le jour. L'inflamation d'une extremité peut augmenter le volume de l'extremité de 50%.

6. Le volume d'une extremité enflammée peut être réduit sensiblement par l'élévation du membre.

7. Le contenu de proteine du fluide oedémateux des extrémités enflammées des malades et chez les animaux de laboratoire est en rapport avec le niveau du plasma sanguin.

8. La pression capillaire du sang est augmentée dans les sites enflammés afin que l'équilibre suivant soit approché: Pression ancotique du plasma $+$ pression capillaire $=$ pression ancotique du tissu $+$ pression tissulaire.

Les facteurs à gauche sont préponderants et entraînent une tendance continuelle vers la formation de l'édème.

9. Les essais cliniques suggèrent que l'immobilisation et l'élévation sont de grande valeur adjointes pour là défense mécanique du corps dans les infections des extremités. Leur emploi repose sur une base physiologique rationnelle. L'emploi de la chaleur dans ces circonstances parait être néfaste.

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CORRECTION

In the April issue of the Journal of the International College of Surgeons the article titled Subphrenic Abscess, written by Hamilton Bailey, F.R.C.S., F.I.C.S., of London, was erroneously credited to Dr. M. J. Rajanna. For this regrettable error The Editors of the Journal tender their sincere apologies to the author, Mr. Hamilton Bailey.

Preoperative and Postoperative Care in Carcinoma of the Rectum and Pelvic Colon

JAMES PATRICK FLEMING, M.D., A.I.C.S.
ROCHESTER, NEW YORK

INTERNATIONALLY, the value of systematically planned preoperative, operative, and postoperative measures in surgery for cancer of the rectum and pelvic colon have been so repeatedly emphasized that the general acceptance of these principles is now universal.

It is my privilege to bring to this assembly a summary of progress manifest in American Clinics as a result of the acceptance of planned care of the cancer patient as presented herein.

The present status of mortality, resectability, operability, and survival can best be judged by observing statistics of follow-up in various centers where emphasis is on radical surgical cure, yet where in most cases a different surgical approach to the problem is followed.

At the Memorial Hospital in New York City, Binkley and Deddish consider the procedure of choice for resection of cancer of the rectum, the Miles abdominoperineal operation because it gives the patient the greatest chance of survival based on the assumption that, while eradicating the primary, it offers complete removal of the node-bearing areas. The mortality rates as reported by Binkley and Deddish [1] are outstanding and reflect the strides of the time toward radical cure. From 1930 to 1939 they report a mortality rate of 16 per cent. From 1940 to 1946, it was 2.3 per cent. In 1939, 130 consecutive operations for rectal cancer were done without a death. The five-year survival rate is 50 per cent.

On the other side of the picture, Bacon in Philadelphia reports an equally startling series for radical cures. The procedure of choice here is the abdominoperineal proctosigmoidectomy with conservation of the sphincter mechanism. In 1946, at the Fifth International Assembly of the International College of Surgeons at Lima, Peru,[2] we reported a series of 251 consecutive abdominoperineal proctosigmoidectomies with a mortality rate of 5.9 per cent; 145 radical resections had been performed without a single death. Recently,[3] Bacon has completed 379 proctosigmoidectomies with 18 deaths, a mortality of about 4.8 per cent. The five-year cure rate, including those for palliation as well as for cure, is 52.6 per cent. Of 560 cases employing various methods and reported recently,[4] 526 had been operated upon, giving an operability rate of 90.2 per cent; 467 were resected—a resectability rate of 80.1 per cent with a mortality from resection of 5.5 per cent (26 deaths).

At this clinic,† while all methods suitable at the time of operation for radical resection of cancer of the rectum are employed, it was found that the establishment of an abdominal colostomy and sacrifice of the sphincter muscles was unnecessary in a large percentage of cases. The proof of this is borne out by reflecting on the five-year survival rate.

Jones [5] of the Cleveland Clinic reports 139 consecutive combined abdominoperineal resections of the rectum from October 1941 to June 1943 without operative mortality, and 535 consecutive one stage abdominoperineal resections from 1942 to 1946 with 20 deaths, a mortality rate of 3.7 per cent. His survival rate is 52 per cent for five year cures.

Lahey [6] in 1946 reported a resectability rate of 83.5 per cent and a mortality rate of 3.8 per cent. A five-year nonrecurrence rate for his entire series of 1800 cases was 50 per cent. Dixon,[7] the champion of the anterior resection for low cancer of the rectum followed by establishment of intestinal continuity, has reported 340 cases operated upon with a mortality rate of 5.9 per cent from 1930 to 1945, and a mortality rate of only 1.1 per cent for the last five years of that period. His five-year survival rate, nonpalliative (palliative

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* Read before the Sixth International Assembly of the International College of Surgeons, Rome, Italy, May [illegible] 1948.

† (Bacon) Department of Proctology, Temple University Hospital and Medical School.

cases excluded) is 67.7 per cent. It is of interest to note that Doctor Dixon's[8] curiosity to follow the technic of anterior resection was aroused when he observed that patients on whom he had performed the Hartman operation continued to live many years without recurrence. It is also of interest to note here that Dixon feels that the Miles operation is not sufficiently radical as his

TABLE 1. MORTALITY AND [illegible]

Clinics	No. of Cases	Mortality Per Cent	[illegible]	[illegible]
Binkley: Memorial	—			
Lahey: Lahey Clinic	1800	2.3 (1940-1946)		[illegible]
Bacon: Temple University	379 A.P.P.S.[4]	3.8	[illegible]	[illegible]
Jones: Cleveland Clinic	535 A.P.R.[5]	4.8		[illegible]
Dixon: Mayo Clinic	340 A R.[6]	3.7 (1942-1946)	[illegible]	[illegible]
		5.9 (1930-1945)	[illegible]	[illegible]
		1.1 (1940-1945)	—	[illegible]
				[illegible]

[illegible] tinuity reestablished.

percentage of perineal recurrence was high. He has now performed between 200 and 300 radical posterior perineal resections including levators and part of the gluteus following single-barrel colostomy and preliminary ligation and division of the superior hemorrhoidal vessels. His results will be forthcoming shortly. Like Dixon, Gilcrest[9] feels that unless the gland-bearing area can be completely eradicated, the low anterior resection should not be employed, but that a Miles operation, or a modification thereof, should be used. His five-year survival for resection of the colon and rectum on 114 cases was 57 per cent. The operability rate on 200 cases reported was 75 per cent (Table 1).

Experience suggests that preoperative preparation paves the way for uneventful surgery and that, in turn, uneventful surgery, carefully planned and performed, paves the way for uneventful convalescence. Such

[illegible] surgery. At the present time I am [illegible] saline in the peritoneal [illegible] with open anas- [illegible]

[illegible]

operative risk. The patient then is admitted to the hospital as an ambulant patient. Habits of a lifetime should not be disrupted abruptly. To evaluate the patient risk, careful physical examination is carried out, this to include electrocardiographic study, vascular status, evaluation of hepatic dysfunction, degree of anemia, prostatic hypertrophy, urinary dysfunction, and metabolic disturbances of sorts.

Caloric, Fluid and Electrolyte Balance. Since a large percentage of patients with cancer of the rectum and colon present varying degrees of metabolic disturbance, hypoproteinemia and avitaminoses with associated dehydration, a concentrated effort is made to place the patient in caloric, nitrogen, fluid and electrolyte balance, as well as in a state of high vitamin concentration. High protein, high carbohydrate and low fat diet is employed consisting of 400 Gm. of carbohydrate, 120 Gm. of protein, and 50 Gm. of fat. To supplement this, 100 Gm. of Delcos Granules * daily are mixed with feedings (Table 2).

TABLE 2. DIET: LOW RESIDUE, HIGH PROTEIN, LOW FAT

	Grams	Calories
Carbohydrate	400	1600
Protein	120	480
Fat	50	450
Delcos Granules * (carbohydrate-protein mixture)	100	320
Total	670	2850

* Sharp and Dohme.

Fluids are forced, if not otherwise contraindicated, to insure a urinary output of 1000 cc. All fluid intake and urinary output is carefully recorded on special fluid balance charts. This will serve as a guide in determining postoperative fluid tolerance and output.

Hepatic Function. Apparently something happens coincident with the presence of the neoplasm which disturbs very seriously hepatic function. This so-called hepatic dysfunction reflects itself in lowered plasma protein, anemia and hypoprothrombinemia. For this reason determined efforts are made to evaluate preoperative liver function.

On the rectal service at Memorial Hospital several criteria are used for determining hepatic dysfunction.[10] Plasma bilirubin levels are carefully observed both preoperatively and postoperatively especially when multiple transfusions are being administered. Bilirubin levels of 1 mg. per cent or slightly above are normal. If they are higher, 2.5 to 3 mg., we suspect something to be wrong with the excretory ability of the liver. The second criterion is hypoproteinemia. Levels of 6.5 Gm. per cent of protein are aspired to. At the Bacon clinic studies were made on all cases with rectal cancer and it was reported[11] that 29.7 per cent of our patients were hypoproteinemic. The use of plasma, diet and hydrolysate is considered the best means of elevating protein blood levels. Usually these patients are also anemic and sufficient blood is administered in small daily amounts, together with injections of crude liver and iron, to raise the grams of hemoglobin to 14 per cent, and the erythrocyte count to at least four and a half million. In the presence of elevated serum bilirubin, however, we advise caution be employed in the use of whole blood. The third criterion to help determine liver dysfunction is hypothrombinemia. If we will but remember that vitamin K is necessary before prothrombin can be made by the liver, we should not then wonder why low levels can be a serious matter. Slow healing of wounds with oozing is often a sequel of this dysfunction which predisposes to sepsis and which in turn gives rise to postoperative loculations of pus and disruption of the postoperative incision. Hence, vitamin K, in doses of 20 mg., is given daily for three days prior to surgery and for three days thereafter. Other useful adjuncts in helping to evaluate hepatic status are plasma level of vitamin A and the cephalin flocculation test.

Vitamin Levels. It is a well-known fact that vitamin levels in most patients with rectal and colonic cancer are low in proportion to low chlorides, proteins and other basic elements. Inasmuch as the ability of the organism to absorb vitamins is disturbed seriously, an attempt should be made to overwhelm the patient with extremely high concentrations of vitamins. Orally, multiple vitamin capsules such as Zymacaps * containing:

Vitamin A	12,500	U.S.P. Units
Vitamin D	1,000	U.S.P. Units
Thiamine HCl	5	mg.
Riboflavin	5	"
Pyridoxine HCl	2	"
Calcium Pantothenate	10	"
Nicotinamide	30	"
Ascorbic Acid	100	"

are prescribed three times daily. Again three days preoperatively, intravenous supplementation with 1000 mg. of vitamin C, and Lyo B-C ** is carried out. Where capillary fragility seems more marked than normal. Rutin *** in 20-mg. doses is administered daily.

Antibiotic Therapy and Streptomycin. It is generally agreed that the greatest single advance in surgery of the colon and rectum has been the discovery and use of nonabsorbable sulfonamide antibiotics, and streptomycin. At the time the diagnosis of cancer is made the patient is placed on one of the nonabsorbable sulfonamide compounds, my preference being sulfathalidine[*] (phthalylsulfathiazole). For a patient weighing 70 kg. a dosage of 1.5 Gm. four times daily will produce the desired therapeutic effect in cleansing the colon.[12] Sulfathalidine is to be preferred to sulfasuxidine (succinylsulfathiazole) because dose for dose it is twice as effective for enteric bacteriostasis, is less toxic[12, 13, 14, 15, 16] and exerts a less diarrheic effect on the bowel. In studies made on the potency of sulfathalidine in 54 cases including 19 proctosigmoidectomies at Temple University Hospital, Department of Proctology, it was shown that sulfathalidine was more potent than sulfasuxidine and that in many cases the quantitative studies of the collected stools, after administration for five days of 0.1 Gm. per kilogram of body weight four times daily, often showed a reduction from 200 million to 10,000 coliform organisms in many cases. Postoperatively as soon as the patient is able to tolerate any fluids by mouth, administration of the drug in preoperative dosage is begun.

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* Supplied by Sharp and Dohme.

* Upjohn.

** Sharp and Dohme.

*** Abbott.

More recently we have supplemented therapy with streptomycin and it is felt the future in colonic surgery will hold more startling results. Streptomycin[†] has proved to be more potent than either succinylsulfathiazole or sulfathalidine when administered orally at the rate of two grams (two million units) daily providing, however, that it is not given for more than two successive days (48 hours) as it has been shown that beyond such dosage and time the coliform organisms develop a resistance to the drug and, regardless of the amount given thereafter, in most cases coliform organisms will continue to remultiply and a reversion of count will be noted.[16, 17] One-fourth gram in 2 oz. of saline, therefore, is administered orally every four hours for two days preceding operation and discontinued the day of surgery. At the present time I am also using 2 Gm. in saline in the peritoneal cavity following resection with open anastomosis.[†] Postoperatively, where contamination has occurred, 0.25 Gm. every four hours for two days intramuscularly, and 300,000 international units of penicillin in oil daily, intramuscularly, are prescribed for that same period. Sulfathiazole sodium is not employed preoperatively but 2.5 Gm. twice daily are administered postoperatively for 48 hours (Table 3).

TABLE 3. ANTIBIOTIC THERAPY AND STREPTOMYCIN

	Preoperative	Postoperative
Sulfathalidine (Phthalylsulfathiazole)	0.1 Gm./kg. b. wt. (5 to 7 days)	Same dosage when oral fluids are tolerated
Streptomycin	2 Gm. daily (48 hrs. before surgery) (0.25 Gm. Q 4 hrs. for 48 hrs.)	Same as preoperatively; intramuscularly — 2 days
Penicillin (oil)	None	300,000 units daily for 2 days
Sodium sulfathiazole	None	2.50 Gm. b.i.d., i.v. 2 days

Thirty-six hours prior to surgery, providing no obstructive element is present, castor oil (1½ oz.) is administered, followed in 24 hours by saline aspiration enemas until the return is clear. To insure complete intubation, a soft rubber tube of large size is left within the lumen of the rectum. An indwelling self-retaining catheter is placed within the bladder the condition of which had been evaluated preoperatively by cystometric studies[18] for bladder capacity and tonicity, and by cystoscopy for the presence of an encroaching extravesical lesion, and prostatic hypertrophy. A weighted intestinal tube[*] is passed to the stomach, connected to a

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[*] Sharp and Dohme.

[†] Abbott, and Sharp and Dohme.

[†] Department of Proctology, St. Mary's, Highland, Park Avenue and Monroe County Hospitals, Rochester, New York.

[*] Cantor or Harris.

Wangensteen suction tube. It is continued in force during the operation, and postoperatively until all signs of abdominal distention have abated.

OPERATIVE CARE

The observation and care of the patient while in the operating room is of equal importance. Our [*] choice of anesthesia is continuous spinal or fractional anesthesia using 1 per cent pontocaine in 10 per cent dextrose solution. But the anesthetic agents selected depend on the anesthetist, his particular findings in the individual case, and the needs of the surgeon. Care must be used in strapping the patient to the table. Tight straps across the thighs, popliteal space or about the ankles are absolutely contraindicated because of vascular injury and therefore the predisposition to venous thrombosis. Airfoam rubber is used to protect the soft parts from the strap. Trendelenburg operating position is preferred because it permits the small intestine to be cleared from the pelvic operative field without the forceful use of packs, surely an important factor in avoiding the formation of adhesions. One thousand cubic centimeters of whole blood are always available and administered as needed during the course of operation. Continuous Wangensteen suction is maintained. Closure is always by figure-of-eight Jones type of closure and with Babcock alloyed steel wire, No. 32. The low incidence of skin infection reported [19] can be attributed in part to the use of wire.

POSTOPERATIVE CARE

Postoperative care unduly neglected may convert the most skillfully performed operation into a tragedy. Skilled nursing is imperative during the immediate postoperative period. Oxygen in high concentrations by tent, dome or mask is administered for 24 hours for the purpose of reducing the amount of body nitrogen and thus avoiding intestinal distention.[20, 21] Postoperative atelectasis should be watched for and measures immediately taken to correct it. If a bronchial plug is suspected, no time should be lost in aspirating the throat or performing bronchoscopy. Passive, and later active, movement of both lower and upper extremities is paramount to discourage venostasis. The lower extremities must be observed daily for tenderness together with unexplained pulse accelerations and apprehensiveness in the patient. Often the two latter may be the only indication of the formation of a silent venous thrombus. If suspected, no time is to be lost in placing the patient on heparin and dicumerol. Where a Miles resection has been performed and a large residual perineal cavity is present, I am inclined toward the performance of immediate bilateral femoral ligation instead of administration of anticoagulants.

Fluid Balance. Postoperatively, methods of determining the patient's water balance are paramount. In an attempt to estimate water balance we should have some idea of the patient's average postsurgical daily intake and should balance this against loss of fluid by respiration, insensible loss through perspiration, kidneys, gastrointestinal tract (vomiting, diarrhea), intraperitoneally per Babcock sump drains, and Wangensteen suction.[21] Sufficient fluids to insure a urinary output of 1,000 cc. is always a good norm to follow, but necessary supplementary methods to determine water balance should be employed, such as erythrocyte count, hemoglobin, hematocrit, and determination of serum protein and chlorides.

Administration of saline during the immediate postoperative period is avoided as salt is not well tolerated by the patient [22] especially in the presence of general body depletion of protein. It should not exceed 500 cc. daily at first unless an excess amount is being lost by vomiting, diarrhea, or draining areas. It has been my custom to employ 10 per cent glucose in sterile distilled water immediately after operation, to allow fluids freely by mouth providing the Wangensteen suction apparatus is functioning, and 1 oz. of water, every hour with the Wangensteen suction tube closed for 15 to 30 minutes. Gradually salt is restored in amounts of 18 Gm. daily, this usually being supplied in the form of 1,000 cc. of 5 per cent glucose in normal saline and in 1,000 cc. of amigen (a protein hydrolysate) * (Table 4).

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[*] Department of Surgery, Proctology and Anesthesiology, St. Mary's, Highland, Park Avenue, and Monroe County Hospitals, Rochester, New York

TABLE 4. POSTOPERATIVE FLUID REGIMEN: EXAMPLE

First Day:	
Glucose, 10% in sterile distilled water	2500 cc.
Amigen,[1] 5% in 0.9% $NaCl$ solution	500 cc.
Whole blood	250 cc.
Total	3250 cc.
Second Day:	
Glucose, 5% in 0.9% $NaCl$ solution	*1000 cc.*
Amigen, 5% in 0.9% $NaCl$ solution	1000 cc.
Whole blood	500 cc.
Sodium lactate, 6 molar solution	500 cc.
Total	3000 cc.
Vitamins in Infusion:	
Vitamin C, mg. 1000	
Lyo-B-C,[2] ampules 1	
Thiamine HCl	100 mg.
Riboflavin	10 mg.
Pyridoxine HCl	10 mg.
Calcium pantothenate	50 mg.
Niacinamide	250 mg.
Ascorbic Acid	200 mg.

[1] Mead Johnson.
[2] Sharp and Dohme

Nitrogen Balance. Just as an attempt was made to maintain the patient in positive nitrogen balance preoperatively, so it is just as necessary to maintain this patient in positive *nitrogen* balance in the *postoperative* period. Since approximately 30 per cent of patients with rectal and colonic cancer are hypoproteinemic,[10, 22, 24, 25, 26] and since it is an established fact that the rectal cancer patients after resection not only lose protein rapidly but do not even make it very well,[10] every effort must be made to supply adequate amounts. High protein reserves should be aspired to preoperatively. In my patients this is accomplished postoperatively by means of the liberal use of small individual transfusions of whole blood, plasma and a protein hydrolysate. Nevertheless, the earliest possible return to a high protein, low residue diet is the best means of maintaining nitrogen balance. It is timely to mention that when the Miles type of abdominoperineal resection or abdominoperineal proctosigmoidectomy (pull-through) is performed, it is possible to begin postoperative oral feedings as soon as the colostomy clamp, in the former, is removed and/or the patient had his first bowel movement in either case. In anterior resection with end-to-end anastomosis, on the other hand, the period of postoperative oral starvation is prolonged and the transition to a preoperative diet is gradual, the patient being maintained on a low residue diet for approximately two weeks. Careful observation, therefore, of protein, chlorides, complete blood counts and hemoglobin must be made and intravenous fluid therapy continued over a longer period.

Urinary Bladder Management. Complications of the urinary tract postoperatively are rather frequent and first become evident 48 to 72 hours postoperatively. The preganglionic sympathectomy performed in freeing the rectum from its pararectal attachments[18] places the bladder in a state of hypotonicity with increased spasm of the detrusor. Likewise the posterior wall of the bladder is left without anything to push against when contracting because of removal of the rectum. The irritation caused at the trigone by the indwelling catheter causes bladder spasm. To avoid complications the bladder is irrigated daily through the self-retaining indwelling catheter with 1:4000 acriflavine solution and at no time is the bladder allowed to become overdistended. On the fifth postoperative day the catheter is removed and a urinary specimen is taken for laboratory study. Every eight hours the patient is catheterized for residual urine. If over three ounces remains after 48 hours, the catheter is replaced. It may often be necessary, especially after the Miles operation, to send the patient home with a catheter in situ and at times even transurethral resection may have to be resorted to. Following abdominoperineal proctosigmoidectomy at the Bacon clinic resort to transurethral resection was never necessary.

Variations may be necessary in the technical postoperative management of the cancer-resected patient, depending on the procedure followed. Where the Miles operation had been performed, the perineal pack is loosened on the second postoperative day coincident with removal of the colostomy clamp, and completely removed on the third and fourth postoperative days. It is our custom to irrigate the open perineal cavity daily with cod liver oil for seven days, and thereafter with 1 per cent ammonium bicarbonate solution. After abdominoperineal proctosigmoidectomy the perforated perineal drain is removed on the second day; the rectal tube is removed when the first bowel movement occurs. In either case the duodenal tube is removed after the first bowel movement and providing no abdominal distention is apparent. Where anterior resection has been performed, with immediate end-to-end anastomosis, preceded by colostomy or cecostomy, the patient is orally starved. Nitrogen balance is maintained parenterally for three days, or until the patient is returned to a low residue diet. Sulfathalidine, 4 oz. of 2 per cent solution, is instilled into the distal colostomy daily. Instillation into the distal colostomy of 1 oz. of glycerin to 3 oz. of water is carried out. This usually effects a bowel movement within 30 minutes. In the two former operations—abdominoperineal proctosigmoidectomy and the Miles procedure—the patient is out of bed walking on the fifth postoperative day; in the case of anterior resection on the first postoperative day.

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* Supplied by Mead Johnson.

Colostomy Care. It is not sufficient to carry the patient to an uneventful postoperative convalescence and then abandon him with a colostomy. As physicians and surgeons it is our duty to encourage, support, and instruct these patients so that they may be psychologically rehabilitated to a new way of life. On my service the patients are instructed on colostomy care, descriptive details being given in simple terminology. On the eighth postoperative day methods of irrigation are demonstrated, the patient gradually being taught his own care. Colostomy bags are best discouraged. Where the colostomy stump is too long, revision of the colostomy is done by electric snare several days before discharge from the hospital.

SUMMARY

Trends in reduction in mortality, increase in operability, and resectability rates, minimization of infections and lengthier survival for the cancer patient have been reviewed with the conclusion that the contributing factors are embodied in systematically planned preoperative, operative, and postoperative measures. Antibiotic therapy, utilizing sulfathalidine and streptomycin, has been the greatest single advance in surgery of the colon and rectum. Skilled nursing and careful observation and anticipation of postoperative complications, especially thromboembolism has done much to reduce mortality to a minimum. The instruction of the patient on colostomy care is briefly discussed.

RIASSUNTO

Dopo avere passato in rassegna le misure atte ad elevare la percentuale di operabilita', a ridurre la mortalita' operatoria, ad attenuare le complicazioni settiche, a prolungare la sopravvivenza degli operati, l'A. giunge alla conclusione che queste dipendono essenzialmente da una perfetta assistenza preoperativa, operativa e postoperativa. Nella chirurgia del colon e del retto, la terapia antibiotica (sulfatalidina, streptomicina) segna un progresso decisivo. La mortalita' postoperatoria e' stata notevolmente ridotta grazie ad una corretta alimentazione, un'accorta osservazione e prevenzione delle complicazioni, con speciale riguardo alle tromboflebiti ed ambolie. L'A. discuite infine le istruzioni da darsi ai pazienti dopo la colostomia.

SUMARIO

El autor hace una revista de los factores que contribuyen ha disminuir la mortalidad y morbilidad en la cirujia del cancer del colon y del recto y que dependen de las medidas pre y post operatorias que se instituyan segun el caso.

La terapeutica moderna antibiotica que usa la sulfatalidina y la estreptomicina es quizas el advance de mayor valor en el tratamiento de estos casos. El cuidado post-operatorio incluyendo la observacion experta anticipando las complicaciones, especialmente la trambo-

flebitis han contribuido mucho ha reducir la mortalidad.

El autor tambien discute las instrucciones que se deben de dar al paciente en el cuidado de la colostomia.

RÉSUMÉ

L'auteur passe en revue la réduction de la mortalité, l'augmentation des indications opératoires, l'étendu de resection, la diminution des infections et la survivance prolongée des cancéreux et arrive à cette conclusion que les facteurs qui ont contribué à ces grands progrès sont dus a l'étude approfondie des traitements preopératoire, opératoire, et postopératoire. La therapie antibiotique, utilisant la sulfathalidine et la streptomycine a grandement avancé les progrès de la chirurgie du colon et du rectum. L'observation soignée et l'anticipation des complications postopératives surtout le thromboembolisme ont reduit la mortalité au minimum. Les recommandations à donner aux malades après la colostomie sont considérées et formulées brièvement.

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Postpartum Dissection and Repair of Preexisting Perineal Relaxation

ARCHIBALD PERRIN HUDGINS, M.D., F.I.C.S.
CHARLESTON, WEST VIRGINIA

THE correction of a preexisting perineal relaxation should be considered during hospitalization of the patient for a subsequent delivery. Bubis,[1] Pride,[7] Costello,[2] and King [6] have reported favorably on this procedure.

There are several reasons favoring repair at this time. The mother is discharged from the hospital in better condition than when admitted. This usually means a more complete and prompt convalescence, less discomfort, less pelvic pressure symptoms, more rapid involution of the pelvic organs, quicker healing with fewer ulcers of the cervix, and less backache. Following an adequate perineal repair, there is an increase in energy, and improved marital adjustment, with accompanying improvement in her general feeling of wellbeing. She is usually better able to nurse and care for her baby. She should, however, be warned that the first few postoperative days will be uncomfortable.

From the standpoint of the physician, the postpartum dissection for adequate perineal repair is important. It gives him an assurance of "work well done" when the patient is discharged from the hospital in better condition that she was before delivery.

The advantages of performing this operation while the patient is in the hospital for a delivery are expense and expediency. It is of economic importance to the patient because the hospital stay and disability coincide for both the delivery and the operation. It is expedient because the patient frequently will not return for the operation if she is allowed to go home with a vague plan to return for a subsequent surgical correction.

All of these advantages are valid only if there is no increased hazard to the patient, and when the operation presents a minimum of technical difficulties.

There are, to be sure, definite contraindications to such an elective surgical procedure which are not to be disputed. Among these are infection, hemorrhage, phlebitis, cardiovascular diseases, or wasting or debilitating disease.

There are also possibly other debatable criticisms of the postpartum dissection and repair of a preexisting relaxation.

1. No additional surgery is advisable at the time of delivery. Pregnancy and labor are thought to be enough strain on the patient's physical resources, without an additional surgical procedure.
2. Increased vascularity of the perineum at the time of delivery increases the hazard of blood loss.
3. The extreme friability of the tissues at the time of delivery makes the operation technically difficult.
4. Increased susceptibility of the patient to infection at this time.

These criticisms may be discussed one at a time: *Pregnancy and Labor Enough Strain, Without Surgery.* Generally speaking, the patient who needs a correction of preexisting relaxed perineum has a comparatively easy delivery. It is usually quick, and tissue stretching and damage are at a minimum because the stretching has occurred previously. Frequently one finds that the easier the delivery of a normal size fetus, the greater the need for a perineal repair.

Blood Loss. If a method can be devised which reduces blood loss, the extreme vascularity of the perineum will not be too great a factor. The author[3, 4] has worked out a technic for perineal dissection and repair which includes the local injection (Fig. 1) of saline solution with adrenalin to aid in dissection and to minimize the blood loss. The vascularity admittedly is greater in the perineum associated with delivery, but the use of saline with adrenalin definitely reduces the vascularity, decreases the blood loss, and facilitates the operative procedure in general.

Tissue Friability. A part of the technic of the operation mentioned above includes steps especially planned to overcome the disadvantage of postpartum tissue friability.

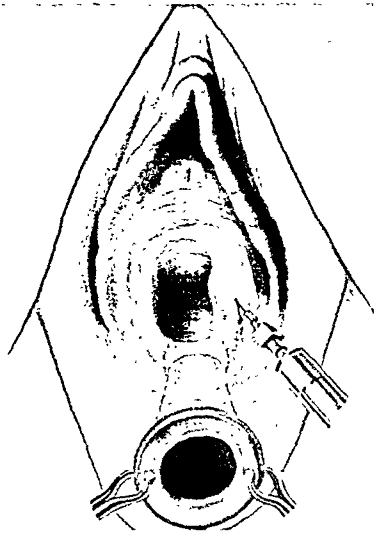

Fig. 1. Injection of solution (30 cc. normal saline with 3 drops adrenalin) under posterolateral wall of vagina, 2 inches within the orifice, deeply about the levator ani muscle. For hemostasis and partial dissection. (To be repeated on opposite side.) An Allis forcep to catch mucosa is helpful in holding tissues and facilitating injection. The large dilator (4 inches long, 1 inch in diameter) is seen held in the rectum by towel clamps attached to skin. (Courtesy, American Journal of Obstetrics and Gynecology.)

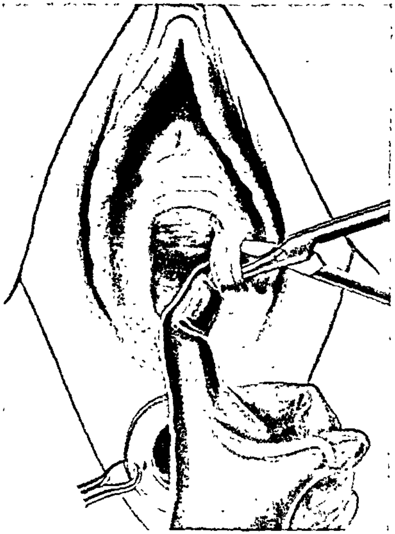

Fig. 2. A 1-inch, vertical stab wound at 4 and 8 o'clock at the vaginal orifice made with curved, blunt-tip scissors which are then inserted deeply through stab wound (2 inches), opened wide, and withdrawn. Proper layer easily identified by shiny, bluish-white appearance of fascia. With the finger in vagina (to guide scissors), the thickness of mucosa-fascia layer gives the feel of about 6 sheets of ordinary paper. Keep tip of scissors up, away from rectum. (Courtesy, Americal Journal of Obstetrics and Gynecology.)

The same technic has also been found to be of advantage in routine perineal repair.

The essential points of this modified dissection for perineal repair are:

1. Injection of one ounce of normal saline solution with adrenalin (2 or 3 drops to the ounce) deeply about the levator ani muscles, left and right. This facilitates dissection and decreases blood loss by vasoconstriction (Fig. 1).

2. The dissection is accomplished chiefly through the initial 1-inch bilateral stab wounds at eight and four o'clock (Fig. 2). The levator ani muscles are dissected as the first step of the operative procedure (the area previously injected), and the vaginal wall (Figs. 3 and 4) is separated from the underlying structures *from above downward*. This method of approach avoids the very friable tissues, finds quickly and keeps in the proper layer. Also less bleeding and less adherent scar tissue are encountered.

The operation proceeds as shown in Figs. 5 and 6, the stab wounds being connected (5) and the classical dissection of the posterior wall flap is completed from below upward in the conventional manner (6).

3. A large rectal dilator (Figs. 1 to 6) distends and identifies the rectum uniformly along the entire course of the operative field, thus facilitating tissue identification for dissection and suturing. The muscles are more easily found and dissected, the rectum is avoided.

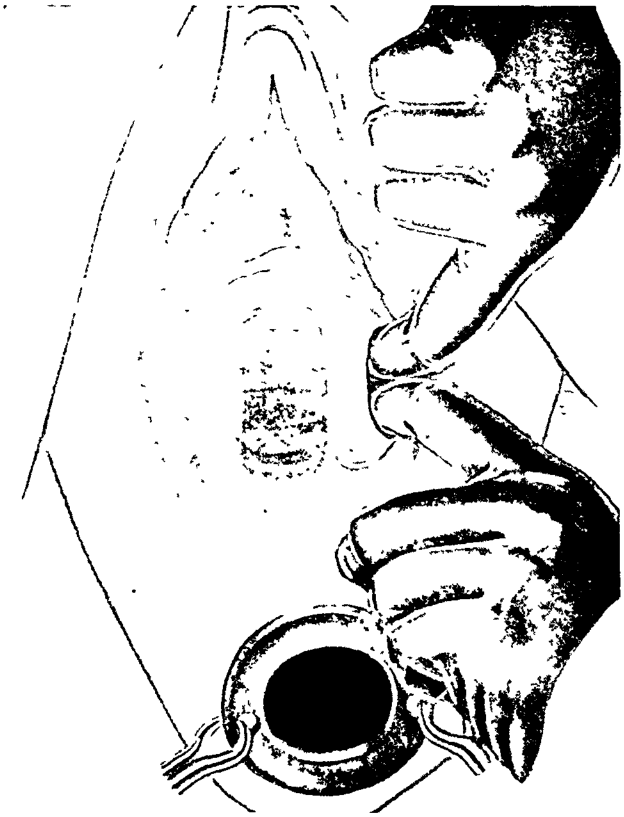

Fig. 3. Dissection of levator ani muscles with index fingers through stab wound. First one finger is inserted high up past the levator ani muscle band. Pressure is made laterally in dissecting the muscle. Then the fingers are turned medially and structures are separated *from above downward*, away from the undersurface of the mucosa-fascia layer. (Courtesy, American Journal of Obstetrics and Gynecology.)

Increased Susceptibility to Infection. The answer here must be in terms of results. What have been the findings and results of the cases studied?

The author has performed and surveyed[*] 100 immediate postpartum perineal dissections and repairs. The results have been found to be satisfactory. All cases were discharged from the hospital within the usual 10 days after the operation and delivery; frequently, on the third to fifth postoperative day. Elevations in temperature, reported in the accompanying table, promptly subsided. Other unfavorable findings occasionally observed were marked swelling of the vulva and urinary retention requiring catheterization for seven to ten days

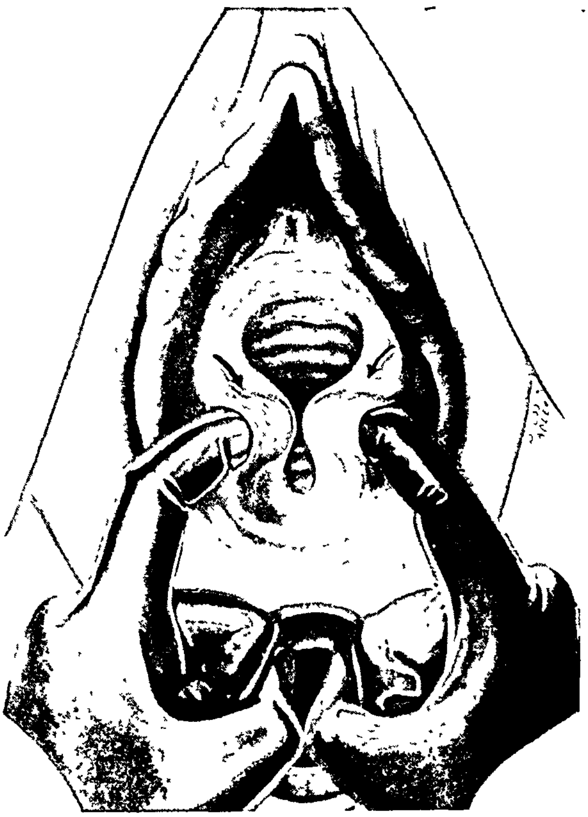

Fig. 4. The index fingers in the left and right stab wounds dissecting the structures *from above downward* as much as can be accomplished by gentle blunt dissection. (Courtesy, American Journal of Obstetrics and Gynecology.)

In the total of 100 cases surveyed, the following unfavorable reactions were found:

	No.	Per Cent
Marked swelling of vulva	2	2
Urinary retention, requiring repeated catheterization for longer than 5 days	2	2
More than normal postoperative bleeding	1	1
Temperature elevation (100.6 or over)	4	4

If a postpartum perineal dissection and repair is to be done, there are factors to be considered in determining when it is to be undertaken; that is, at the time of delivery, or on the first to fifth day following delivery. Chief among the factors to be considered are uterine blood loss (during delivery), the possibility of shock associated with the delivery, and other factors concerning the welfare of the mother or child which may require the

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[*] [illegible] an additional 75 cases have been added [illegible] with even fewer unfavorable reactions.

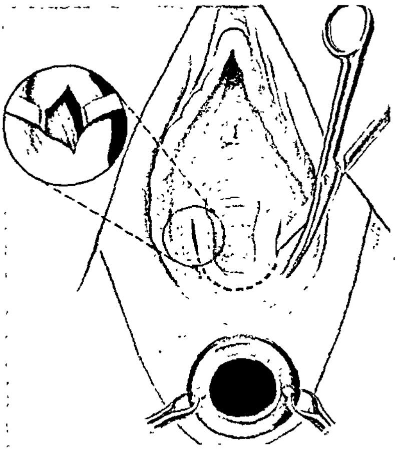


Fig. 5. The posterior ends of the bilateral, deeply and completely dissected stab wounds are being connected. *Insert:* Retracted stab wounds showing muscles exposed with chief parts of dissection quickly completed through stab wound in less vascular, non- (or slightly) traumatized region; away from adherent areas. Wound is dried with gauze and then packed with gauze dipped in saline: adrenalin solution. Thus bleeding is further controlled. (Courtesy, American Journal of Obstetrics and Gynecology.)

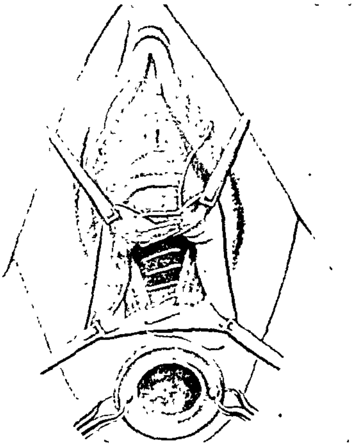


Fig. 6. Routine, classical dissection of the vaginal mucosa-fascia layer from the underlying structures has been completed from below upward, the wedge-shaped segment removed. The large long rectal dilator is shown in place. This gives uniform, complete dilation along the entire lower bowel, which is involved in the operative field. Thus, the rectum is quickly, aseptically, completely, identified from the operative wound above for dissection and suturing. Running mattress suture for plication of the fascia overlying the rectum and the fascia under the vaginal mucosa. (Courtesy, American Journal of Obstetrics and Gynecology.)

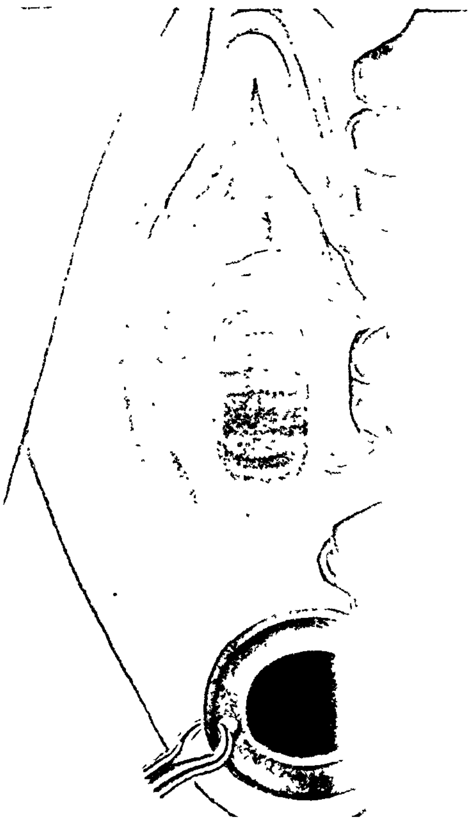
immediate, undivided, prolonged attention of the physician.

The advantages of doing the perineal repair while the patient is on the table for delivery are: (1) A second anesthesia is avoided. (2) The psychologic factor of "another operation" is avoided. (3) The additional expense for a second anesthesia, and repeated use of the delivery (or operating) room is avoided. (4) The time factor (the physician, the hospital staff, and the operating room schedule). While the patient is in the delivery room, in stirrup position, with all instruments available, only 20 to 30 minutes additional time is usually required to complete the perineal dissection for repair.

The only additional time required in this type of procedure, in contrast to that for episiotomy which, in many hospitals, is almost routinely considered for primipara, is that required for the dissection. Suturing is similar to the suturing of the episiotomy.

In this connection nerve-block anesthesia for delivery (spinal, saddle, caudal) has many advantages. The writer's choice is low spinal anesthesia. An additional operating time of 20 to 30 minutes under an existing anesthesia (which continues to be effective) minimizes anesthesia factors.

The perineal repair done on the first to fifth day following delivery, has certain advantages: (1) The whole procedure is more elective. The choice of time is left to the obstetrician (or surgeon), rather than having it chosen by a stroke of nature. When the patient goes into labor spontaneously, there is no choice of time. Unnecessary procedures may have to be curtailed owing to the condition of mother or child or due to the fact that others may be waiting for the delivery room. A choice of time, an [illegible]a more delibe[illegible] procedure has [illegible] [illegible]antage he[illegible]



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RÉSUMÉ

La dissection et la correction du relâchement préexistant au moment d'un accouchement subséquent presente certains avantages pour le malade et pour le médecin. Les mesures avantageuses de la nouvelle technique sont:

1. Injection locale de saline (solution) avec adrenaline pour faciliter la dissection et l'hémostase.

2. On disséque les muscles élévateurs de l'anus de haut en bas; car ici ces tissus sont moins friables, moins vasculaires et renferment moins de tissus cicatriciel.

3. On emploie un dilateur rectal ayant un pouce de diamêtre et 4 pouces de longueur; cela facilite l'identification, la dissection et la suture des tissus.

4. Ce procédé donne une operation plus complète et prend moins de temps.

Les resultats de 100 dissections postpartum perineales et leur réparation furent étudiés et furent trouvés favorables dans tous les cas. Des complications temporaires presque négligables sont notées dans la Table N. 1.

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7. Pride, W. T.: Southern M. J. 23:781, 1930.

2. Better preparation and condition of the operative field. There are times when labor progresses so rapidly that the most ideal preparation and enemas are not available. This is better controlled when the surgical procedure has been postponed. Then the lower bowel is more adequately cleansed, and more time can be allowed for exacting scrutiny in preparation of the vaginal surgical field.

3. Cooperation of patient. In the rush which inevitably accompanies a certain number of obstetrical patients, especially with general anesthesia, the field is sometimes inadvertently contaminated by movement of the patient or disruption of drapes. *It would be poor judgment, indeed, to continue with an elective surgical procedure under less than ideal conditions.*

4. The fourth or fifth postoperative day has some advantages. The tissues have become more firm, are much less friable, and consequently are more easily dissected.

I have long been convinced[5] that the sitz bath is the method of choice for postoperative perineal care both in obstetrics and gynecology. The observation of over 3,000 cases over a period of 12 years using "the sitz bath method" convinced me that the healing is better and the convalescence hastened with greater comfort to the patient.

Special attention should be directed toward adequate emptying of the bladder. Adequate medication should be prescribed for the expected discomfort.

SUMMARY

Dissection and repair of preexisting perineal relaxation at the time of a subsequent delivery has certain advantages for both patient and physician. Essential points of advantage in the new technic presented are: (1) Local injection of saline with adrenalin to facilitate dissection and hemostasis. (2) Bilateral stab wounds for dissection of levator ani muscles and *dissection from above downward*, thus dissecting where tissues are less friable—less vascular—less scar tissue. The proper plan is more easily followed. (3) A large rectal dilator (1 inch in diameter, 4 inches long facilitates tissue identification, dissection and suturing. (4) Procedure is much more quickly completed.

Results of 100 postpartum perineal dissections and repairs were favorable in all cases. A few instances of minor, temporary complications were noted.

The sitz bath is advised for postoperative care.

RIASSUNTO

Nei casi di ptosi del piano perineale un' operazione plastica eseguita al momento del parto successivo offre dei notevole vantaggi.

L'operazione viene eseguita: (1) dopo infiltrazione locale di soluzione fisiologica con adrenalina onde esporre meglio i piani di clivaggio e favorire l'emostasi. (2) con una doppia incisione, dall'alto in basso, allo scopo di porre in evidenza e ravvicinare bilateralmente, i muscoli dell'ano (3) onde facilitare l'identificazione, la dissezione e la sutura dei tessuti, un largo dilatatore metallico viene introdotto preventivamente nel retto.

La plastica perineale viene eseguita—in queste condizioni—piu' facilmente e piu' rapidamente che nell'intervallo fra i parti. I risultati sono stati tutti favorevoli sopra cento casi cosi' operati.

SUMARIO

La reparacion de las roturas pre-existentes del perineo en el parto siguiente ofrece ciertas ventajas pare el paciente y para el medico. En la tecnica nueva que se ha presentado hay cietos puntos ventajosos, que son: (1) La inyeccion local de solucion salina con adrenalina para facilitar la diseccion y favorecer la hemostasis. (2) La incision bilateral a modo de herida de cuchilla para ayudar la diseccion de los musculos elevadores del ano y cuya diseccion se comienza de arriba abajo. (3) La introduccion de un dilatador rectal de largo calibre (2½ cm. de diametro y 10 cm. de largo) el cual facilita la identificacion de los tejidos y su correcta sutura. (4) Este procedimiento se puede llevar a cabo en menos tiempo.

Los resultados obtenidos en 100 casos de reparaciones del perineo en el periodo del post-parto han side favorables en todas.

En el cuadro 1, se presentan las complicaciones que ocurrieron en esta serie.

RÉSUMÉ

La dissection et la correction du relâchement préexistant au moment d'un accouchement subséquent presente certains avantages pour le malade et pour le médecin. Les mesures avantageuses de la nouvelle technique sont:

1. Injection locale de saline (solution) avec adrenaline pour faciliter la dissection et l'hémostase.

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4. Ce procédé donne une operation plus complète et prend moins de temps.

Les resultats de 100 dissections postpartum perineales et leur réparation furent étudiés et furent *trouvés favorables* dans tous les cas. Des complications temporaires presque négligables sont notées dans la Table N. 1.

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Epithelization Time After Gastrectomy*

K. KATRAKIS, M.D., AND A. KARTSONIS, M.D.
ATHENS, GREECE

WHILE the literature on surgery of gastroduodenal ulcer is voluminous there are few reports available on the time of epithelization of the surgical wound in the mucosa of the stomach and intestine.

Apparently, Marchand was the first to occupy himself with this question and published his results in 1893. This was an experimental investigation of the manner in which cicatrization of mucosal wounds took place and the length of time necessary for its complete accomplishment.

Pozzi, Griffini and Vassale also studied epithelization after excision of 2 to 3 cm. of the stomach mucosa. According to Pozzi, who experimented on dogs, regeneration of the superficial epithelium is effected in 7 to 10 days but becomes physiologic after a few months. Griffini and Vassale admit that 10 to 15 days after excision of 2 to 3 cm. of the mucosa the site of excision is found only with difficulty. The glandular alveoli are formed in 40 days and the secretion of gastric juice from the area takes place within 90 days.

Gara and Neusillof, experimenting on dogs and rabbits, made an incision through the entire wall of the stomach and then closed it with a Mikulicz-Albert suture. A few hours after suture the changes in the wound lips are slight. After one or two days the lips present necrotic changes—bloody and inflammatory infiltration. After six days the necrotic portions between the traumatic lips are shed, disclosing areas of regeneration. After a fortnight the lips of the mucosa approach each other and in 24 days the gap is replaced by granulation tissue. Within 32 days restoration of the mucosa is complete.

Gara's experiments were especially interesting. He demonstrated that with three rows of sutures the gap in the mucosa is much smaller and cicatrization is completed sooner.

Hertel questions the value of necropsy findings because of postmortem anatomic changes.

Summing up the reported results of research it may be said that: After resection of a portion of the mucosa, epithelization is completed within 7 to 15 days. After incision through the entire wall of the stomach more time is necessary for epithelization.

Process of Epithelization. The gap in the mucosa is at first covered by flat epithelium which later is transformed into cuboidal and cylindrical epithelium. The regenerative ability of the mucosa is good in spite of the presence of gastric juice. More time is required for restoration of the glands. Both the epithelium of the divided glands and the covering epithelium contribute to the restoration of the glands (Mathews). Healing of the muscularis is effected by cicatrization. In the intestine epithelization takes place in a way similar to that in the stomach, but the conditions are simpler because the epithelium of the glands, which is similar to the surface epithelium, contributes to epithelization. Obstruction of a glandular tubule (follicle) on a spot of epithelization may induce cyst formation which Close has called epithelial cyst of traumatic lips.

Close, Rosebaum and Caïnne oppose the use of the thermocautery on the ground that it retards epithelization of the wound, provokes a more intense inflammatory infiltration, postoperative hemorrhage, septic embolism, etc.

FECAL HEMOGLOBIN AND EPITHELIZATION TIME

Our studies on the time of epithelization of the surgical wound in the gastroduodenal tract, especially of the gastroenterostomy wound, was undertaken for two reasons: (1) The great clinical importance of the time of epithelization; (2) the bearing which the length of time required for epithelization has on diet after gastrectomy.

Our study was an investigation of the blood in the feces of gastrectomy patients. The Meyer reaction was employed for this purpose as being most sensitive.

In a series of 149 patients who had undergone gastrectomy we examined the feces for hemoglobin from the fifth day after operation until the Meyer reaction became negative. In a few cases the first negative reaction was followed by a positive, but within two or three days the reaction became finally negative. Naturally, the patients examined for hemoglobin in the feces were put on a diet which after digestion leaves no hemoglobin. We particularly stress the fact that, in order to eliminate erroneous results, the patients used in the study were as a rule those in which a radical resection of the stomach with the ulcer had been performed, in order to avoid erroneous results which might occur in the presence of ulcer. Furthermore, the technic was the same employed by all operators (submucous stitches, two rows of sutures, etc.), which also helped to exclude error.

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* [illegible] Surgical Clinic of the University of Athens

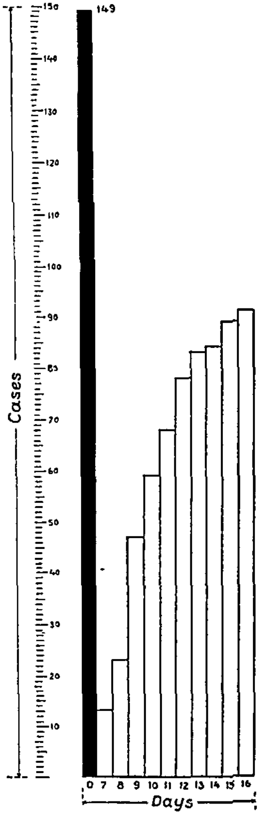

Fig. 1. Total number of cases operated on (black column) and the cases which were negative for hemoglobin (white column).

The results in 149 cases may be noted in Figure 1.

In 14 of the 149 cases the reaction became negative by the seventh postoperative day.*

Table 1.

Cases	Postoperative Day Reaction Became Negative
14(14)	7th
23(9)	8th
47(24)	9th
59(12)	10th
68(9)	11th
78(10)	12th
82(4)	13th
84(2)	14th
89(5)	15th
91(2)	16th
58(58)	contin. positive after 16th day
Total 149	

It is clear that in 47 cases the Meyer reaction became negative between the seventh and ninth postoperative days while 44 became negative between the tenth and sixteenth postoperative days. In 58 cases the reaction continued positive even after the sixteenth day. We also compared the rate of epithelization of the gastrectomy wound where the surgical knife and where cutting diathermy were employed. The prevailing opinion has been that the use of thermocautery should be rejected because it exerts a retarding influence upon the cicatrization of the wound. Some surgeons still believe that the use of cutting diathermy in surgery of the gastrointestinal tract must be avoided because it can provoke electric shock of the tissues and necrosis, resulting in inadequacy of the suture. This is incorrect, however, and we must not disregard the contribution of diathermy to the progress of the surgical technic in general and to surgery of the stomach in particular. Figure 2 shows that the Meyer reaction became negative in a greater number of cases in which cutting diathermy was used as compared with those in which it was not.

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* In some operations the surgical knife was used, in other cutting diathermy.

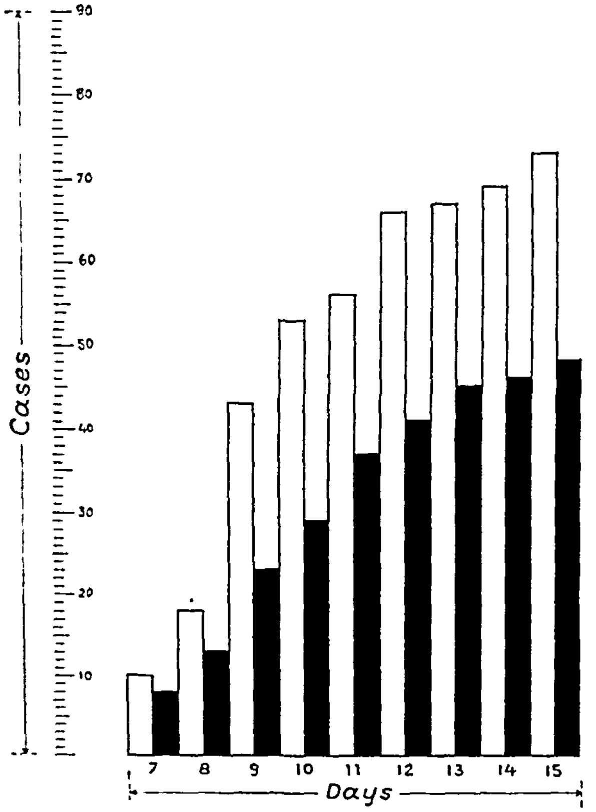

Fig. 2. White columns show the cases which were negative for hemoglobin by use of cutting diathermy. Black columns show those operated on with the surgical knife.

Using the disappearance of hemoglobin from the feces as a criterion, we must conclude that the results refute the view of a retarding action of the diathermy knife on wound cicatrization. On the contrary, this technic contributes considerably not only to perfect hemostasis, but also to earlier cicatrization of the wound.

Again, using as criterion the negative reaction for hemoglobin in the feces we point out that epithelization is complete in some of the cases by the seventh postoperative day, though the epithelium may not yet be physiologically functional, as pointed out by Pozzi.

The fact that our results do not agree with those of Gara according to whom the wound through the stomach wall is filled with granulation tissue in 24 days and completely epithelized within 32 days, may perhaps be due to progress in the operative technic of gastrectomy. Also, comparisons between animal and human experiments must be made with reservations.

The Meyer reaction after gastrectomy may have some clinical value besides indicating the progress of wound epithelization. A Meyer reaction that continues to be positive indicates that the cicatrization of the wound is not yet completed and the diet must be adjusted accordingly.

SUMMARY

The time necessary for epithelization of the gastroenterostomy wound was studied by investigating the hemoglobin in the feces. From this study the following conclusions could be drawn:

1. By the seventh postoperative day the feces were negative for hemoglobin in a substantial number of cases.
2. In 91 of 149 cases, or 61 per cent, the feces were negative for hemoglobin by the sixteenth postoperative day.
3. Where cutting diathermy was employed the feces became negative for hemoglobin earlier, indicating earlier cicatrization of the wound.
4. The investigation of the feces for hemoglobin is recommended on a large scale for postgastrectomy patients, as a guide to convalescent diet for these patients.

SOMMAIRE

Le temps nécessaire pour l'épithélisation de la plaie gastro-entérostomique fut etudié par la recherche de l'hémoglobine dans les matières fécales. De cette étude, les auteurs tirent les conclusions suivantes: (1) Vers le septieme jour postopératoire, les fèces furent

négatives pour l'hémoglobine dans un nombre de cas. (2) Dans 91 de 149 cas ou 61% des cas, les fèces furent négatives pour l'hémoglobine vers le 16ème jour postopératoire. *(3) Après l'emploi de la diathermie* coupante, les fèces furent négatives pour l'hémoglobine plus tôt, indiquant ainsi une cicatrisation moins tardive de la plaie. (4) L'analyse des fèces pour l'hémoglobine est à recommander chez les malades soumis a la gastrectomie Cette analyse sert de guide pour choisir la diète appropriée pour les convalescents des opérations sur l'estomac.

SUMARIO

Los autores han investigado la hemoglobina de las heces como un indice de la epitelizacion de las gastro-enterostomias. Y presentan las siguientes conclusiones.

En un numero eubstancial de casos la hemoglobina desaparace de las heces en el septimo dia post-operatorio.

En una series de 149 casos 91 o el 61% las heces fueron negativas en el decimo sexto dia.

Los casos operados con el escalpelo electrico (diatermia) sus heces se hicieron negativas mas tempranamente, indicanda mas rapida cicatrizacion.

Se recomienda la investigacion de ha hemoglobina de las heces como un procedimiento post-operatorio en las gastrectomias por cuanto sirve de guia en el regmen dietetico *durante la convalesencia.*

RIASSUNTO

Hanno studiato il tempo necessario per l'epitelializzazione della gastro-enterostomia attraverso la ricerca dell'emoglobina nelle feci. Sono giunti alle seguenti conclusioni: *(1) In moltissimi casi l'emoglobina scompare* gia' sette giorni dopo l'operazione. (2) Sopra 159 casi, in 91 (61%) l'esame delle feci e' riuscito negativo 16 giorni dopo l'operazione. (3) L'emoglobina scompare prima, indicando percio' una piu' rapida cicatrizzazione della ferita, allorquando viene usato il coltello diatermico. La ricerca dell'emoglobina e' un *utile sussidio per guidare l'alimentazione* dei pazienti operati di gastroenterostomia.

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Clinical Evaluation of a New Technic in the Sclerotherapy of Varicose Veins

EGMONT J. ORBACH, M.D.
NEW BRITAIN, CONNECTICUT

IN 1944 I described a new technic for the injection therapy of varicose veins.[1] In that technic dilution of the sclerosing agent with blood was prevented, at least for a short time. It consisted of the introduction of a small volume of air into the lumen of the vein, preceding the injection of the agent. Displacement of the blood by air permitted the undiluted solution to act directly on the intima, thus producing a more effective destruction of the intima-endothel than had been possible by conventional methods. The term, conventional methods, is used to refer to the methods of injection commonly employed in which the solution is either injected into a vein filled with blood ("full vein" technic, Riddle[2]) or into an empty vein ("empty vein" technic, McPheeters[3]). While theoretically ideal, the "empty vein" technic is not used widely owing to technical difficulties and the inherent danger of paravenous injection.

AIR-BLOCK TECHNIC

The patient is injected while standing upright. One cubic centimeter of air is aspirated into the syringe previously filled with the sclerosing agent while holding the syringe with the needle pointing upward. The injection is made, while holding the syringe in approximately the same position so that first the air, and then the solution is injected. As soon as blood appears in the syringe, the air and the sclerosing solution are injected with continued movement. This procedure is illustrated in Figure 1.

The first impression of the reader might be that this procedure involves the danger of air embolism. That this is not the case has been discussed extensively in a previous paper.[1] It has been shown that air embolism never occurs when a small amount of air is introduced into the saphenous veins or their tributaries. According to H. F. Richardson and coworkers,[4] 480 cc. of air has to enter the venous system within 20 to 30 seconds to cause death in a person weighing 132 lbs. A search of the literature fails to disclose report of the occurrence of air embolism when air entered the saphenous vein or its tributaries. Furthermore, in my practice this method has been used for over 5 years in hundreds of injections without a single incident of air embolism.

SCLEROSING AGENTS

The following is a report of a comparative study consisting of three series of injection treatments of varicose veins, each comprising 293 injections.

In the first two series, the standard solutions using the conventional and the air-block method were recorded and then compared (Table 1). In the third series the air-block technic was used in combination with a new sclerosing agent, Sotradecol * (Table 2).

The following sclerosing agents were used:

1. De-L-S. This is a solution containing 15 per cent lithium salicylate plus 25 per cent dextrose. About 5 cc. of this solution were injected at any one site. The solution was used mainly in the treatment of large varicosities.

2. Varisol. This agent is similar to De-L-S. as it is also a hypertonic solution, consisting of 30 per cent invert sugar and 15 per cent sodium chloride. The solution was used only for very large veins, 10 cc. being injected.

With Varisol and De-L-S the empty vein technic was followed in most instances.

3. Quinine Hydrochloride and Urethane. This solution contains quinine, 2 gr., and urethane, 1 gr. per cc. It was used in a small percentage of the cases in doses of ½ to 2 cc.

4. Water-Soluble Salts of Fatty Acids. To this group belong the following agents: sodium morrhuate 5 per cent, used in doses

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* Material for this study was supplied by the Research Department of Wallace & Tiernan Products, Inc.

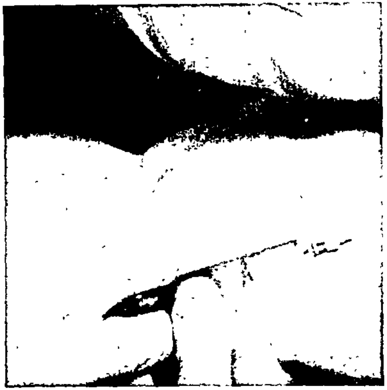

Fig. 1. With the patient standing, the syringe is held almost vertically. The plunger is retracted, and about 1 cc. of air is aspirated into the syringe above the sclerosing agent. The needle is inserted into the vein. Blood appears in the syringe. With one continuous motion, first the air, and then the sclerosing agent are injected into the vein.

of ½ to 5 cc.; monolate and ethalate (monoethanolamine oleate 5 per cent), used in doses of ½ to 5 cc.

RESULTS

The summary of the results obtained with these agents, using the conventional method and the air-block technic, is given in Table 2.

Of the 293 injections made by conventional methods, 212 resulted in complete obliteration and 11 in partial obliteration. Local reactions were observed in 35 instances, and sloughing occurred in 15 cases. Using the same solutions in combination with the air-block technic, out of 293 injections 241 produced complete obliteration, 23 partial obliteration; local reactions were produced in 23 instances, and sloughs were encountered twice.

In view of the fact that the results with various soluble fatty acid salts were rather similar, this group was considered as homogeneous, and is summed up in Table 3. It can be seen that the incidence of complete obliteration increased more than 10 per cent when the air-block technic was adopted. The inci-

TABLE 1. COMPARISON OF THE CONVENTIONAL AND "AIR-BLOCK" TECHNICS

Sclerosing Agent	No. of Injections		Complete Obliteration		Partial Obliteration		Reactions		Sloughs	
	Conven. Method	Air-Block Method	Conven. Method	Air-Block Method	Conven. Method	Air-Block Method	Conven. Method	Air-Block Method	Conven. Method	Air-Block Method
De L S	13	46	8 (61.5%)	37 (80.4%)	1 (7.7%)	6 (13.0%)	1 (7.7%)	2 (4.3%)	1 (7.7%)	1 (2.2%)
Varisol	17	12	10 (58.8%)	8 (66.6%)	1 (5.9%)	1 (8.3%)	3 (17.6%)	0 (0%)	1 (5.9%)	0 (0%)
Quinine Hydrochloride and Urethane	7	17	6 (85.7%)	13 (76.5%)	0 (0%)	0 (0%)	1 (14.2%)	2 (11.6%)	0 (0%)	0 (0%)
Sodium Morrhuate 5%	49	129	30 (61.2%)	107 (82.9%)	5 (10.0%)	9 (6.8%)	4 (8.9%)	10 (7.8%)	8 (16.3%)	1 (0.8%)
Monolate	85	45	63 (74.1%)	37 (82.2%)	1 (1.2%)	4 (8.9%)	16 (18.8%)	5 (11.1%)	3 (3.5%)	0 (0%)
Ethalate	122	44	95 (77.9%)	39 (88.6%)	3 (2.5%)	3 (6.8%)	10 (8.2%)	2 (4.6%)	2 (1.6%)	0 (0%)

TABLE 2. SUMMARY OF RESULTS COMPARING THE CONVENTIONAL AND "AIR-BLOCK" TECHNICS USING CONVENTIONAL SCLEROSING AGENTS AND SOTRADECOL

		Obliteration			
		Complete	Partial	Reactions	Sloughs
Conventional Sclerosing Agents	Series of 293 Injections Conventional Method	212 (72.3%)	11 (3.7%)	35 (11.9%)	15 (5.4%) (including 4 deep sloughs)
	Series of 293 Injections "Air-Block" Method	241 (82.3%)	23 (7.8%)	23 (7.8%)	2 (0.7%) (no deep sloughs)
Sotradecol	Series of 293 *Injections* "Air-Block" Method	257 (87.7%)	17 (5.8%)	3 (1.0%)	0 (0%)

dence of complete failure was about one-fourth of the total number of injections when conventional methods were used, and only one-tenth of the number of injections when the air-block method was employed. Since the incidence of local reactions is not appreciably different in the two series, it must be concluded that the local reactions are caused by the chemical character of the sclerosing agent, and that they are not influenced by the type of injection technic. The incidence of sloughing in the air-block series, however, is only one-tenth of that encountered in the conventional series, indicating the safety of the new method.

TABLE 3. COMPARISON OF RESULTS WITH FATTY ACIDS, USING THE CONVENTIONAL AND "AIR-BLOCK" TECHNICS (CONVENTIONAL AGENTS)

	Conventional Method 265 Injections	"Air-Block" Technic 218 Injections
Total dosage	443.05 cc.	360.25 cc.
Dosage per injection	1.63 cc	1.65 cc.
Complete Obliteration	188 (71%)	183 (83.9%)
Partial obliteration	9 (3.4%)	16 (7.3%)
Local reactions	30 (11.3%)	19 (8.7%)
Sloughs	13 (4.9%)	1 (0.5%)

ADVERSE SIDE REACTIONS

There are two classes of adverse side reactions which are particularly disturbing, and militate against the use of sclerosing agents and against the injection therapy of varicose veins in general.

Systemic reactions, which are the most dangerous, occurred only once in the entire series. They can be avoided, or at least considerably decreased, if a minute test dose is given, and if the total amount of injected sclerosing agent is kept at a minimum at each treatment session. This principle was followed successfully, except in one instance of quinine intoxication in a patient apparently sensitive to quinine. By using safe doses of the various agents for one injection, the percentage of complete obliteration resulting from the injection was relatively low when the conventional method was employed. The incidence of failures using the same dose has been reduced greatly in the series in which the air-block technic was employed.

Adverse local reactions are less serious, but they occur more frequently. Some local reaction is associated necessarily with the injection therapy of varicose veins, but if the necrotizing action of the injected agent proceeds beyond the intima through the layers of the vein and surrounding tissue, reactions will be strong. They are due to chemically produced periphlebitis and possibly even to necrosis. The extent to which such reactions can be restricted to the intima of the vein depends on the chemical nature of the sclerosing agent, on its concentration, on the volume injected, on the state of sensitization, and also on the physiologic state of the vein wall, and the surrounding tissues which are often degenerated due to the pressure to which these tissues have been exposed for a prolonged period of time.

Severe reaction and sloughing naturally may be caused by most of the sclerosing agents if they are allowed to escape into the perivenous space at the time of the injection Strong sclerosing agents are more likely to cause severe local reactions. It has been emphasized by Hirschman[5] and others that, to avoid these reactions, it is important to reduce the amount of injected solution to the minimum required The purpose of the air-block is to make this possible. After segmental ligation of varicose veins it has been observed that the vein between the two occluded vein sectors becomes obliterated (Ferguson[6]). The same is true of the vein sector which lies between two segments which have been thrombosed by the injection of a sclerosing agent.

It is well known that a large thrombus is an ideal medium for recanalization. On the other hand, permanent obliteration is much more readily obtained by concretion of the vein wall, the intima of which has been damaged by agents, than by the organization of an excessive thrombus. The distention of the veins after the injection of the sclerosing agent and the subsequent formation of large thrombi can be prevented by the application of firm bandages after treatment. In the few cases in which extensive thrombosis and formation of coagula have occurred, I have obtained good results[7] by evacuation of formed large thrombi, coagula, and stagnant blood through stab incisions and application of pressure bandages afterwards. Usually, concretion of the vein wall and permanent obliteration followed.

The desirability of producing small thrombi, as emphasized by Ochsner,[8] is further motivated by the attempt to avoid thereby embolism which follows massive thrombosis more frequently.

In this connection it is interesting to note that Westerborn[9] reported in 1937 that the mortality incidence among 30,000 injections was 0.03 per cent. Up to that year usually large doses of irritating and toxic agents were used.

Venous obliteration by concretion is aided greatly by simultaneous venous spasm which often occurs after the injection of the sclerosing agent.

One of the most important advantages of the air-block technic becomes apparent if the two last columns of Table No. 1 are compared. The incidence of sloughs has been decreased to less than one-third when De-L-S was used, and to less than one-twentieth when morrhuate was used. The appearance of sloughs practically was eliminated in connection with the use of the other sclerosing agents.

The air-block method offers a valuable safeguard against hazardous paravenous injections. The injection of air preceding the injection of the sclerosing agent produces a subcutaneous emphysema if the needlepoint has not been inserted completely within the lumen of the vein. This emphysema can be seen instantly and clearly, thus serving as a warning to remove the needle and to inject at another site. The appearance of blood in the syringe is not always a certain proof that the needlepoint is completely inside of the vein. It may happen, even with a short beveled needle, that only the distal half of the point is within the lumen and that the proximal half is within the vein wall or outside the vein wall. In this case, blood will appear in the syringe, yet a part of the sclerosing agent may escape into the vein wall or into the surrounding tissue.

In the series in which the air-block technic was used, there was no instance of deep slough. In the other series, however, four cases of deep sloughing occurred, which required more than three weeks for healing.

RESULTS WITH SOTRADECOL

A third series of this study consisted of 293 injections made with a new sclerosing agent —Sotradecol—using the air-block method. Sotradecol (sodium tetradecyl sulfate) was introduced into the sclerotherapy of varicose veins by Reiner[10] in 1946. This product was selected because experimental studies have shown that it has remarkable thrombogenic activity, combined with a minimum tendency to produce tissue irritation. Cooper[11] and Hirschman[5] tested this agent on a large series of cases, confirmed essentially the conclusions based on pharmacologic observations, and stated that this agent is two to four times as effective as the fatty acid salts. Systemic reactions, cramps, sloughing, skin eruptions, and local reactions occurred less frequently than with other sclerosing agents, according to Cooper, and were practically absent in Hirschman's series, who emphasized the importance of using only small amounts of this solution at any one site of injection.

Thirty-nine injections were made with 1 cc., six injections with 0.75 cc., four with 0.7 cc., three with 0.6 cc., 151 with 0.5 cc., twelve with 0.4 cc., thirty-six with 0.3 cc., forty-one with 0.25 cc. and one injection with 0.15 cc.

It is evident from Table 2 that the percentage of complete obliteration is higher in the Sotradecol series than in the two preceding series in which standard agents were used; it exceeds by 5 per cent the obliteration obtained with the air-block series (with standard solutions) and by 15 per cent the oblitera-ion obtained with the series using the con-ntional methods (with the same standard utions).

Local reactions were noted only in 1 per cent in the Sotradecol series as compared with 11.9 per cent and 7.8 per cent in the series in which conventional solutions were employed. There were no sloughs in the Sotradecol series as compared with an incidence of 0.7 per cent in the air-block series with standard solutions and 5.4 per cent in the conventional method-series using standard agents.

Results obtained with Sotradecol are compared with the results from the fatty acid series in Table 4. Complete obliteration was observed with Sotradecol in 87.7 per cent as compared with 83.9 per cent with the standard fatty acid salts. The incidence of local reactions with Sotradecol was 3 (1 per cent) which is one-eighth of that observed with the fatty acids (8.7 per cent). The inflammatory symptoms in the cases of local reactions were minimal. They were distinctly less than seen with other sclerosing agents. Slough was produced in one instance by the injection of fatty acid salts, but no slough occurred in the Sotradecol series. Allergic or other systemic reactions were not encountered. In this connection it may be interesting to note that a patient, suffering from hypersensitivity to adhesive tape, tolerated 3 cc. of Sotradecol administered in 6 injections at three sessions without any symptoms. It is noteworthy that these results were obtained with an average dose of 0.4 cc. of Sotradecol in contrast with 1.7 cc. of the fatty acid salts, notwithstanding the fact that the concentration of the active ingredient in the latter was 5 per cent, whereas that of Sotradecol was only 3 per cent.

TABLE 4. COMPARISON OF RESULTS WITH FATTY ACIDS AND SOTRADECOL, USING THE "AIR-BLOCK" TECHNIC

	Fatty Acid Group	Sotradecol
Number of injections	218	293
Total amount of sclerosing agent used	360.25 cc.	129.75 cc.
Average amount per injection	1.7 cc.	0.4 cc.
Obliterations	183 (83.9%)	257 (87.7%)
Local reactions	19 (8.7%)	3 (1%)
Sloughs	1 (0.5%) (superficial)	0 (0%)

Previous reports on the use of Sotradecol do not give the average dose used, but only the range. It is my opinion that the average dose of Sotradecol was reduced by employing the air-block technic. It is certainly remarkable that the percentage of takes with an average dose of 0.4 cc. Sotradecol is higher than the percentage of takes in the fatty-acids group where the average dose is over 4 times as large (1.7 cc.).

Owing to the fact that the vein sections between two occluded vein sectors undergo secondary obliteration, as previously stated, the number of injections per leg did not have to be increased in the Sotradecol series in spite of the reduced amount of Sotradecol per single injection. Here as in the other two series, where the average dose of the sclerosing agent was 1.7 cc. as compared with 0.4 cc. in the Sotradecol series, the number of injections per leg varied between 4 and 6.

SUMMARY

A new technic for the injection therapy of varicose veins is described in which the initial dilution of the agent by blood is prevented by the introduction of a small air bubble into the lumen of the vein, immediately preceding the injection of the sclerosing agent. There is no danger of air embolism.

Results tabulated indicate that with the air-block technic a greater incidence of obliteration is obtained than with conventional methods. The method was tested with six sclerosing agents (De-L-S, varisol hydrochloride, quinine and urethane, sodium morrhuate, ethalate and monolate).

The air-block technic was used in testing the efficiency of Sotradecol, a new sclerosing agent, in a small preliminary series of cases. This agent, combined with the new technic, yielded complete obliteration in 87.7 per cent of the injections with an average dose of 0.4 cc. This compares favorably with 83.8 per cent of successful obliterations obtained with an average dose of 1.7 cc. of fatty acid solutions.

There were 15 cases of postinjectional slough in the series of the conventional injection technic, and not one case of slough in the Sotradecol air-block series, demonstrating the advantage of the new method and sclerosing agent to safeguard against paravenous injection.

No systemic or severe local reactions were noted. Mild local reactions were observed in 3 cases.

The importance of minimal thrombosis is stressed, and methods discussed to produce venous obliteration by intima concretion, and not by organization of large thrombi. The secondary removal of excessive coagula and stagnant blood, which sometimes occur during the days following the injection, is recommended as one important step in the perfection of the sclerotherapy of varicose veins.

SUMARIO

En esta tecnica nueva de escleroterapia de las venas varicosas se previene la dilucion inicial del agente esclerosante por la sangre con la introduccion de una bobita de aire en el lumen de la vena. No hay peligro al embolismo.

Este procedimiento da mejores resultados que los metodos convencionales y se uso con seis agentes esclerosantes para determinar su eficacia. Con el uso del agente esclerosante, sotradecol, esta tecnica produjo la obliteracion completa de las venas en 87.7 por ciento de los casos siendo la dosis .4 cc. En esta serie no se presentaron complicaciones de seriedad. Reacciones locales benignas ocurrieron en 3 casos.

Es importante el remover todos las cuajos que se formen dias despues de la inyeccion para obtener buenos resultados.

RÉSUMÉ

Dans cette nouvelle technique de la sclérothérapie des varices, on évite la dilution initiale de l'agent sclérosant par le sang, en introduisant une petite bulle d'air dans le lumière de la veine immédiatement avant l'injection de l'agent sclérosant. Il n'y a aucun danger d'embolie d'air.

Cette nouvelle méthode donne un plus grand nombre d'obliterations que les méthodes ordinairement employées. On fit emploi de six differents grands sclérosants (De-L-S, Varisol, Quinine, Urethane, Sodium Morrhuate Etalate et Monolate).

L'auteur recommende l'emploi du Sotradecol avec la technique recommandée. Cette méthode donna une oblitération complète dans 87.7% des cas avec une injection moyenne de 4 cc. Cette méthode compare favorablement avec l'emploi d'une dose de 1.7 cc. des solutions d'acide gras. Il n'y eu aucune reaction systémique ou locale serieuse dans tous les cas présentés.

L'importance de trombi minimaux est discuttee. Il est préférable de produire une oblitération veineuse par concrétion de l'intima et non par l'organisation de grand thrombi. L'ablation secondaire de caillots excessifs et de sang stagnant qui parfois sur-

vient après l'injection est recommandée pour le perfectionnement de la sclérotherapie des varices.

RIASSUNTO

Con la nuova technica proposta dall' A. nella terapia sclerosante delle vene varicose, la diluizione iniziale del liquido iniettato viene prevenuta dall' iniezione preliminare di una piccola bolla d'aria nel lume della vena. Il pericolo di un' embolia gassosa non esiste. I risultati riportati dall'A. confermano che con questo metodo la percentuale di obliterazione dell vene e' maggiore che con gli altri metodi. La nuova procedura e' stata istituita con diversi liquidi sclerosanti (De-L-S, Varisol, chinino-uretano, morruato di sodio, etalato e monolato).

In una piccola serie preliminare di casi, l'A. ha usato il Sotradecol, un nuovo agente sclerosante. Un' obliterazione completa e' stata ottenuta con cc. 0,4 nell' 87,7% dei casi: con soluzioni di acidi grassi occorre invece una quantita' media di cc. 1,7, mentre la percentuale di obliterazione scende all' 83,8%.

L'A. non ha notato alcune reazione grave, locale o generale, successiva all' operazione.

Viene sottolineata l'importanza di una trombosi minima delle vene iniettate: vengono inoltre discussi i metodi per conseguire un' obliterazione per concrezione dell'intima e non attraverso un'organizzazione di larghi trombi

L'A. raccomanda——quale importante fattore nella scleroterapia delle vene varicose—una rimozione secondaria di coaguli troppo estesi e di sangue stagnante qualora cio' si verifichi nei primi giorni dopo l'operazione.

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Pseudocysts of the Pancreas and External Drainage[*][†]

FEYYAZ M. BERKAY, M.D., F.I.C.S.
ISTANBUL, TURKEY

THE purpose of this article is to report 5 cases of proved pseudocyst of the pancreas of pancreatitic and traumatic origin which were successfully treated by marsupialization and external drainage, and to discuss and evaluate the different surgical technics, particularly internal cystovisceral anastomosis and external drainage, employed in the treatment of these pseudocysts.

Pancreatic cysts, especially pseudocysts, are of infrequent occurrence although encountered often enough to merit some diagnostic and therapeutic consideration. In fact, with growing knowledge of pancreatic lesions, and improving laboratory aids to diagnosis—pancreatic function tests, the reaction and ferment concentration of the pancreatic juice by mecholyl injection (Bauman and Whipple[2]), blood amylase activity tests, and roentgenologic examinations—the number of recorded cysts and pseudocysts are rapidly increasing; so much so, in fact, that preoperative clinical diagnosis is coming to be a matter of some accuracy.

Since 1882, much progress has been made in the diagnosis and operative treatment of cysts and pseudocysts of the pancreas. In that year Gussenbauer's[5] publication on marsupialization and external drainage of the pancreas opened an avenue of approach to a technical field which previously had been entered only on sporadic and rare occasions. Numerous contributions to the technical details of the operation have appeared in the literature in succeeding years, and complete reviews of their development have been recorded. As a result, the subject of pancreatic cysts can be approached today with a clearer conception of the operative technic and with a reasonable chance of accomplishing a surgical cure. Despite widening experience with this surgical problem, however, the incidence of postoperative complications continues high, some of the most distressing being external pancreatic fistulae, chemical enzymatic dermatitis, and irritation and excoriation of the skin. Enzymatic digestion and irritation of the skin occurs all too frequently with marsupialization with resultant drainage of pancreatic juice and consequent development of external pancreatic fistula. Many methods—mechanical, chemical, or surgical fistulovisceral anastomosis—have been employed in an attempt to eradicate the external fistula. To overcome this handicap of external drainage, a new method of internal drainage was devised whereby the pancreatic cyst is anastomosed either to the stomach, duodenum, jejunum, or gallbladder. Jedlika[9] was the first to attempt internal anastomosis (1921). Several interesting reports on the results and various modifications of this new surgical procedure have been made since Jedlika's publication. Thus the subject of cystovisceral internal anastomosis of pancreatic cysts have received increased attention in the surgical literature during recent years. Nevertheless, it has seemed to us that the indications for the use of these major surgical procedures differ considerably, depending upon such factors as the site of origin and pathologic nature of the pancreatic cyst. Even so, it remains apparent that no one of the procedures in use at the present time is adequate for the management of all forms of pancreatic cysts, or for the prevention of various complications. From a consideration of our clinical observations and experiences we believe that the selection of the proper type of operative procedure such as marsupialization and external drainage, internal visceral anastomosis, and total extirpation of the pancreatic cyst is dependent upon many factors. Furthermore, the epithelial lining of the cyst is extremely important in the selection of surgical procedure. It is our opinion and conviction that marsupialization and external drainage (cystodermal anastomosis) is the procedure of choice for pseudocysts of the pancreas. Consequently, this operation [illegible] formed on a great many patients without the occurrence of serious complications and with a very satisfactory end result. On the other hand, external drainage is a simple procedure which can be performed in a rather short time with minimal tissue trauma or risk. We must not lose sight of the fact that internal visceral anastomosis of the pancreatic cysts, in addition to its rather complicated operative technic, involves more disadvantages and serious complications in the follow-up period such as secondary contamination and suppurative infection of the cystic cavity, secondary perforation and hemorrhage to the gastrointestinal tract due to enzymatic digestion of the cystic walls. This is particularly true in pseudocyst of the pancreas. For this reason, notwithstanding the fact that this new method (internal anastomosis) has produced spectacular results in the treatment of other types of pancreatic cysts (true cysts), it has been found wanting and impractical in the treatment of pseudocysts. This failure is due to the inherent nature of pseudocysts. Many hopes have been raised with the advent of this new surgical method but have met with disappointment, owing to lack of appreciation of the differences existing between the various pathologic characters of true pancreatic cysts and pseudocysts, as well as the specialized problems involved in the operative cure of pseudocyst. It is evident that rational therapy can be administered only when the pathologic character of the condition is appreciated. Characteristically, pseudocysts of the pancreas have no proper wall, no epithelial lining, are bounded by the peritoneum of the omental sac and adjacent organs, originate practically always as a result of pancreatic necrosis or trauma, and contain fluid consisting of a mixture of disorganized pancreatic slough and inflammatory exudate, often some more or less altered blood, and sometimes considerable amounts of pancreatic ferments. Furthermore, surgical eradication, that is, total extirpation of pancreatic pseudocysts, creates the difficult problem of promoting healing in absence of a proper wall. Consequently, the rational surgical method and successful procedure of choice for the treatment of pseudocyst would seem to be marsupialization and external drainage.

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[*] From the First Surgical Clinic Istanbul University Faculty of Medicine

[†] Read before the Twelfth National Assembly, United States Chapter, International College of Surgeons, Chicago, Sept 29-Oct 4, 1947

A distinct advantage of external drainage is the reduction of the opportunity for secondary contamination of the cystic cavity and possibility of secondary hemorrhage and enzymatic activity.

With the discovery of new pancreatic function tests, and with new pathogenetic and therapeutic concepts, the subject of pancreatic cysts and pseudocyst has received increased attention in the surgical literature during recent years. However, cysts and pseudocysts of the pancreas have been reported and discussed in the medico-surgical literature since 1830.

HISTORY AND INCIDENCE

In 1842 Claessen was able to collect a number of individual case reports from the literature. Virchow and Klebs described autopsy findings, and Friedrich, in 1878, pointed out that the clinical diagnosis of pancreatic cysts was very difficult and the treatment symptomatic and dietary. Körte[13] stated that the literature revealed 177 cases of pancreatic cysts up to 1902. Guleke made a complete survey of all reported cases in the literature between 1882 and 1911 and found reports of 260 operated cases. Heinrich Muller reviewed the literature on pancreatic cysts and found an additional 196 case reports between 1912 and 1929. Shmieden and Sibening, in 1927, reviewed 127 cases of pancreatic cysts. Walter and Cleveland cite Thigpen's review of 139 cases treated surgically at the Mayo Clinic between 1908 and 1939. Walter, Puestov, and McCaughn stated that the incidence of pancreatic cysts was 1 in 8000 admissions to the latter institution. A review of the accumulated clinical records revealed that this diagnosis has been made in only 9 cases since the origin of the Lahey Clinic from 1926 to 1945 (Ralph Adams and Randal A. Nishijima). In a general review of pancreatic cysts it was found that the average incidence of pancreatic pseudocysts was 40 per cent of all pancreatic cysts. In our clinical records there were only 5 cases of pseudocysts in 14,000 clinical admissions between 1938 and 1946.

CLASSIFICATION OF CLINICAL TYPES

Judged by the medical literature, the classification of pancreatic cysts is varied and extensive.

I. Classification of Archibald Adams and Ralph Adams:
  1. Adenocystomas
  2. Retention cysts
  3. Degeneration cysts
  4. Pseudocysts

II. Classification of Oser as modified by McWhorter:
  1. Retention cysts
     - A. Chronic indurated pancreatitis
     - B. Compression of the duct from without
     - C. Obstruction of the duct from within (calculi, parasites, catarrhal inflammation)
  2. Cystic neoplasms (proliferative type)
     - A. Congenital
       - a. Dermoid cyst
       - b. Congenital cystic disease
       - c. Teratoma
       - d. Fetal adenoma
       - e. Mixed tumor
     - B. Acquired
       - a. Cystadenoma
       - b. Epithelioma cystica
  3. Pseudocysts (cysts resulting from hemorrhage, degeneration, or necrosis)
     - A. Intrapancreatic
       - a. Degeneration tumors, sarcoma, carcinomas, etc.
       - b. Trauma
       - c. Vascular disease
       - d. Pancreatitis
     - B. Extrapancreatic (caused by same factors as in the intrapancreatic pseudocysts)
  4. Pancreatic cysts—echinococcus

III. Robson and Cammidge classification:
  1. Retention cysts
  2. Proliferation cysts
  3. Congenital cysts
  4. Hemorrhagic cysts (secondary to necrosis and bleeding)
  5. Hydatid cysts
  6. Pseudocysts
  7. Dermoid cysts

IV. Kaufmann classification:
  1. Cystic adenoma and Lymphangioma (so-called proliferation cysts)
  2. Dysontogenetic cysts (Wegelin, Yamane)—congenital cystic disease of the pancreas. Solitary cystic pancreas or very rarely associated with cystic liver (Verf. Glang, Hennicke, v. Meyenburg, Yamane) and cystic kidney.
  3. Acquired true cysts—retention cysts, true glandular cysts
  4. Cystoids or pseudocysts

V. Körte's classification:
  1. True glandular cysts of the pancreas
     Anatomic and surgical classification
       - a. Uni- or multilocular macrocysts
       - b. Polycystic tumors

     Histologic classification
       - a. Canalicular cysts—retention cysts of secretory ducts and canaliculae, or ranula pancreatica Virchow
       - b. Proliferation cysts — cystoma glandulare proliferum (according to Lazarus, these are most frequent forms)
  2. Pseudocysts or cystoids

The foregoing review affords evidence that a considerable similarity exists between the classifications of various authors. Körte's classification, however, possesses definite advantages not only from the clinical and pathologic but also from the surgical standpoint. It emphasizes clinical, pathologic, and surgical distinctions between true glandular pancreatic cysts and pseudocysts. Körte's data, with some modification and consideration, give the following classification of pancreatic cysts:

1. True glandular cysts. These forms are true glandular cysts arising from the parenchymal cells of the pancreas by proliferation, or secretory canaliculae by obstructive and inflammatory process and are therefore glandular structures lined with epithelium and with a proper wall.

A. Retention cysts (canalicular cysts Körte, ranula pancreatica Virchow, acne pancreatica or multiple cysts of the pancreas Klebs) which usually are small cysts lined with epithelium of cuboidal excretory type. The pathogenesis still is not entirely clear but it has been observed that they are caused by obstruction such as tumor, calculus, or scar in the pancreatic duct, smaller ducts, or acini, and are associated with a sclerotic process in the pancreas. As the result of investigations by Dieckhoff, Tilger, and Speese it is assumed that the cause lies in chronic interstitial pancreatitis, but pathologically this may be interpreted as the result of the condition, rather than its cause. The experimental results from ligation of the main duct and injection of tincture of iodine into the pancreatic substance with stagnation and sclerosis (Lazarus) may explain the development of retention cysts in man.

B. Blastogenic cysts, cystic tumors, cystic neoplastic formations. The term is employed here to designate the larger group of cysts to be considered in the general category of benign tumors of as yet undetermined etiology. These are true tumors arising from the parenchymal cells by proliferation and possess therefore typical glandular structure. They are lined with cuboidal or cylindrical epithelium, are frequently multilocular, and do not contain pancreatic ferments. They are of comparatively infrequent occurrence.

a. Congenital cysts: (a) Dermoid cysts (Guleke); (b) Congenital cystic disease—dysontogenetic cysts (Kaufmann, Wegelin, Yamane) as part of a developmental disturbance involving other organs (liver, kidney); also congenital cysts of the pancreas without developmental disturbance elsewhere. (c) Teratomas; (d) Fetal adenomas; (e) Mixed tumors.

b. Acquired forms: (a) Cystadenoma, adenocystoma, proliferation cysts (Körte), cystoma glandulare proliferum. These are frequently compared with the adenocystomas of the ovary. (b) Cystepithelioma, epithelioma cystica, true glandular cystic tumor formations.

2. Parasitic cysts (echinococcus or hydatids).

3. Pseudocysts. These designate the accumulation of fluid that is produced by trauma, necrosis (pancreatic) or degenerative changes in the interstitial tissue of the pancreas. From the pathologic standpoint, pseudocyst may be subdivided into two fundamentally different classes:

A. Degeneration cysts. These present the softening and cystic formation of destroyed tissue in the pancreas. Most frequently, they are an end result of acute pancreatic necrosis by the liquefaction of the dead pancreatic tissue, or of the autodigestion of effused blood. They may also develop as the result of toxic or infective lesions such as may occur in typhoid or general sepsis as well as from the softening of cancer or sarcoma (Lazarus). There is no sharp line of demarcation between the degeneration cysts and pseudocysfs. At least the two classes overlap. Between these and the pseudocysts there is a difference only of anatomic situation, the degeneration cysts being mostly intrapancreatic, and the pseudocysts juxta or prepancreatic.

B. Posttraumatic or postpancreatitic cystoids or pseudocysts are juxta- or prepancreatic. We agree with Körte that the largest number of pancreatic cysts coming to operation belong to this group. These are distinguished from the true glandular and degenerative cysts by their anatomic situation being outside the substance of the pancreas and usually in the lesser omental sac. They have neither proper wall nor epithelial lining; their wall is constituted by the peritoneal boundary of the omental sac and by adjacent organs. The cystic contents consist in part of more or less disorganized and liquefied necrotic self-digested pancreatic tissue, in part of inflammatory exudate (Cases 1, 5), and often more or less altered blood (Cases 2, 3, 4). The cystic contents, therefore, may be only slightly turbid and serous (Cases 1, 5), yellowish, brownish-green (Cases 2, 4) or even blackish. In one case (Bruère), the fluid gave a definite reaction for bile although hematoidin crystals pointing to hemorrhage give the same reaction. This observation suggests the action of bile in causing the original lesion which led to cyst. As to pancreatic ferments, it is possible to find small amounts of pancreatic ferments in any cyst which has been accompanied by hemorrhage. Diastase has slight diagnostic significance, lipase has somewhat greater value while if trypsin is found it is fair to assume a pancreatic origin. It should be noted that the content of the pseudocyst has a markedly increased ferment activity. This fact has been proved in our clinical cases, but it is of slight diagnostic significance in distinguishing true cysts from pseudocysts.

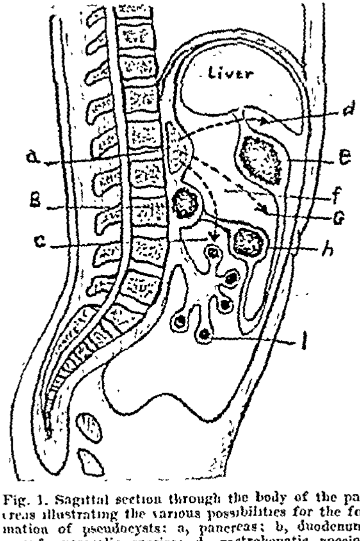

Fig. 1. Sagittal section through the body of the pancreas illustrating the various possibilities for the formation of pseudocysts: a, pancreas; b, duodenum; c, inframesocolic species; d, gastrohepatic species; e, stomach; f, lesser sac; g, gastrocolic species; h, transverse colon; i, small intestine.

ANATOMIC CONSIDERATIONS

The pancreas lies in the epigastrium and left hypochondrium in a retroperitoneal position behind the serosal floor of the lesser omental sac, at the level of the first and second lumbar vertebrae. It is bounded posteriorly by the nonresilient posterior abdominal wall, and for this reason lesions of the pancreas are likely to extend forward in the direction of least resistance and generally into the lesser sac. A diagrammatic sagittal section through the body of the pancreas demonstrates clearly the various locations in which a pancreatic cystoid may be found (Fig. 1).

The three most common locations occupied by pancreatic cysts and pseudocysts in order of frequency are listed according to Lazarus, and Judd, Matson and Mahorner.[10]

1. Cyst presenting between the stomach and transverse colon and behind gastrocolic ligament (species gastrocolica Lazarus, supramesocolic or gastrocolic location).

2. Cystic growth may take place upward, presenting between the stomach and liver under the gastrohepatic omentum (species gastrohepatica Lazarus).

3. Cyst lying between the layers of the transverse mesocolon either behind the transverse colon or below it (species mesocolica or infracolica Lazarus). Very rarely these cysts may assume a position behind the descending colon, and may even descend into the pelvis. In our series the pancreatic pseudocysts presented the most common locations of the cysts between the stomach and transverse colon and behind the gastrocolic ligament (gastrocolic species of Lazarus).

ETIOLOGY AND PATHOGENESIS

Pancreatic cysts, especially pseudocysts, have been observed at all ages but most frequently in patients in middle life. One case, however, in a five months old child, was reported by Elia[4] Traumatic cysts occur predominantly in the male presumably because he is more often exposed to trauma. In the present series of 5 cases there were 4 males and 1 female. The youngest was 16, and the oldest 35 years of age (Table 1).

TABLE 1

Case	Sex	Age	Type of Pseudocyst Cyst
1	Male	16	Traumatic
2	Male	26	"
3	Male	35	Postpancreatitic
4	Male	23	"
5	Female	27	"

The most frequent cause of pseudocyst formation is a preceding attack of acute or subacute pancreatic necrosis (hemorrhagic pancreatitis, postpancreatitic pseudocyst), or the condition may follow posttraumatic acute and subacute hemorrhagic pancreatitis due to isolated open injury or solitary contusion of the pancreas (posttraumatic pseudocysts). The great majority of pseudocysts follow acute pancreatic necrosis. Posttraumatic cysts make up from one-third to one-fourth of all pancreatic cysts. According to Mickulicz in pseudocysts there is a traumatic origin in 25 per cent. In Körte's series of 129 cases 33, or 27 per cent, were traumatic pseudocysts. Lazarus gives a posttraumatic origin of 30 per cent, and Goebell in 33 per cent. In Schmieden's total 128 cases 16 were due to trauma, 28 to pancreatitis, 11 to tumor, and in 73 the cause was unknown or unrecorded. Honigman, in 1905, was able to collect 69 posttraumatic pseudocysts from the literature. Between 1905 and 1933 134 new cases were added to this total. Considering recently published cases, the number of traumatic pseudocysts recorded in the literature is about 215. Of our 5 cases 2 were of posttraumatic and 3 of postpancreatitic origin.

The classic paper by Jordan Lloyd describes the pathology and pathogenetic mechanism of posttraumatic pancreatic pseudocyst so well that one cannot do better than quote him. "A blow in the upper part of the abdomen especially in the epigastrium may crush the pancreas against the first and second vertebrae, its serosal covering being thin, may be easily torn through, and bleeding will then take place under the parietal peritoneum (hematocele), or into the lesser sac, where the resulting fluid collects (pseudocyst)." Nevertheless, it is a fact that posttraumatic pseudocysts have been associated most frequently with an acute hemorrhagic pancreatitis and have been developed following traumatic acute or subacute pancreatic necrosis. Under these circumstances one must accept the autodigestive role of activated trypsin and enzymatic activity of the pancreatic juice (lipase) due to injury and tearing of the pancreatic acini, lobules or secretory ducts (Case 2).

It is evident that while every injury to the pancreas does not lead to a pseudocyst, many of them do. This is also the case with open wounds which are rarer than the subcutaneous contusions. While many of the patients survive because the exudate becomes localized, others lose theirs through a rapid spread of necrosis in the organ.

In the earlier literature, trauma was frequently mentioned as the etiologic agent in the production of pseudocysts. But in most of the pancreatic pseudocysts it is not possible to find preceding upperabdominal trauma as an etiologic factor. Körte and Quenue first classified the pathogenesis of nontraumatic pseudocysts, demonstrating the important causative role played by partial necrosis of the glandular tissue. More recently emphasis has been placed on the role of acute and subacute hemorrhagic or edematous, that is, exudative, pancreatitis as the etiologic agent.

The pathogenesis is still undecided. It has been suggested that partial obstruction of the pancreatic ducts may lead to necrosis. There is ample evidence to prove that cholecystitis and acute and chronic pancreatitis coexist in a large percentage of cases. But the cause of such coexistence is still obscure and the source of the provocative agent is unknown. Lecène, Dragstedt, Haymond, and Ellis have shown that in 60 per cent of the cases of acute hemorrhagic pancreatitis, there was antecedent biliary tract disease. "In 3 of our cases of pseudocysts of pancreatitic origin, there was no previous history of biliary tract diseases." In 10 per cent of these, a common channel was produced by the impaction of gallstone in the ampulla of Vater; in the majority of the remainder a common channel was produced by spasm of the sphincter of Oddi, or edema of the papilla. Thus a study of the literature makes it apparent that, both "the common channel theory of bile reflux, and the obstructive theory with its concommitant concentration of the alkaline pancreatic juices within the pancreas" are both tenable theories as to the production of acute pancreatitis. Among many explanations of the cause of pancreatitis the "common channel theory" seemed most plausible to the greatest number of clinicians until Rich and Duff, seeking the cause of acute hemorrhagic pancreatitis in cases in which there was no ampulla of Vater, conclusively demonstrated that in some cases acute hemorrhagic pancreatitis is due to metaplasia of the epithelium of the duct with associated dilatation of the duct and acinar rupture behind the obstructing metaplasia.

Current theories postulate that bile entering the pancreatic duct in man produces necrosis of the pancreas because of its own irritating and necrotizing properties or bacterial content (Brunschwig), or because it activates the inactive trypsinogen of the normal pancreatic secretion while the latter is still in the pancreatic ducts. Person and Brunschwig, who emphasize the role of infection introduced by the reflux of bile content say that necrosis of the pancreas is produced either through the direct action of the bacteria or through the destructive effect of *trypsin which follows on the activation of* trypsinogen by bacteria or their products.

All authors agree that the peculiar characteristic of the necrosis which accompanies hemorrhagic pancreatitis depends on the action of pancreatic lipase which is secreted in active form and which escapes into the tissues when necrosis of the pancreas occurs. Some authors believe that the hemorrhage *of acute hemorrhagic pancreatitis is the result* of a vasomotor reflex due to "local anaphylaxy-tissue allergy" (Bergeton, Couvelaire 1933, Gregoire, Schweitzer, Silvestri 1935). Others believe that it results from venous thrombosis (Chabrol-Gilbert) and still others that it results from erosion of the blood vessels by pancreatic trypsin (v. Bergmann, Gulcke). Rich and Duff, and Lepine found *that the specific vascular lesion causing the* hemorrhage was located in the media of the vessel. This process apparently is a rapid one and quickly involves the entire thickness of the vessel wall with a final destruction of the intima. The lesion is quite distinguishable from that characteristic of the familiar arteriosclerosis.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS

The diagnosis of pseudocysts usually is made from a close consideration of the physical findings and the history, evaluation of the pancreatic function tests and other laboratory and x-ray findings. Clinical symptomatology and the elements of diagnosis have been detailed and mentioned in the records of our reported cases. For this reason, we will only review the most important clinical signs from the standpoint of diagnosis.

Pain is the most frequent and constant symptom at the onset, a fact which indicates the large share which acute or subacute pancreatitis has in causation of pseudocysts of *traumatic or pancreatitic origin. Pain* usually is located in the upper part of the abdomen, especially in the epigastrium, and extends to the back, left shoulder and shoulder blade. It is due to irritation of the solar plexus and as a rule has the character of severe repeated painful attacks of celiac neuralgia. Usually it is associated with nausea, vomiting and sometimes hiccups. The *initial painful attack disappears for a time,* reappearing only when the cyst has grown to such a size as to cause distention. During the period of gradual formation of the cyst the patients complain only of indefinite symptoms, chiefly gastric distress, or loss of appetite and a feeling of weight in the epigastrium. Frequently the only evidence may be symptoms of pressure on the neighboring organs, *especially on the stomach, with anorexia and* epigastric discomfort after meals which may be accompanied by nausea, vomiting, gaseous distention and diarrhea. Rapid loss of weight also is often observed and is considered characteristic of pancreatic cyst by Payr. Slight evidence of internal and external secretory insufficiency of pancreas may be present (pancreatic indigestion and diabetes). Coprologic *examination, blood, and urine sugar and* glucose tolerance tests should be done. The period of growth of traumatic pseudocysts usually is from 8 or 10 days though it may be three to four weeks (Case 1, 4 days; Case 2, 19 days) until it becomes obvious to examination. In cases following acute pancreatitis this period may be from one week up to several weeks or months (Table 2). The *presence of a smooth, tense, immobile (except* when located in the tail of the pancreas) abdominal mass situated above the level of the umbilicus in the upper and middle abdomen is the most helpful and reliable diag-

TABLE 2

Case	Type of Cyst	Interval Between Causative Factor and Cyst Formation	Clinical Findings	Complications
1	Traumatic pseudocyst	4 days	Solar syndrome.* Large cystic mass in upper part of the abdomen (epigastrium and left hypochondrium), hypochromic anemia	—
2	"	19 days	Solar syndrome with acute hemorrhagic pancreatitis, deep shock, peritoneal manifestations, anemia, large cystic mass in the epigastrium and left hypochondrium	Spontaneous rupture into the gastrointestinal tract (duodenum and transv. colon), severe repeated hemorrhage (hematemesis, melena) colisepsis
3	Postpancreatitic pseudocyst	2 days	Solar syndrome with fever, secondary anemia, large cystic mass in the epigastrium and upper part of the abdomen	—
4	"	45 days	Solar syndrome, fever, gastro-intestinal disorders, large cystic mass in the epigastrium and the upper half of the abdomen	—
5	"	2 months	Solar syndrome, large cystic mass in the left hypochondrium	—

* Pain, nausea, vomiting.

nostic sign. Pulsation is found frequently in these, being communicated from the aorta.

Roentgenologic Examination. Roentgenography is a major aid in the diagnosis of pseudocysts of the pancreas. The presence of an enlarged duodenal loop, or a filling defect of the stomach, hour-glass stomach, displacement of the stomach and transverse colon due to extrinsic pressure, low-lying position of the transverse colon and splenic flexure, supports accurate diagnosis of a pancreatic pseudocyst.

Function Tests. One of the very important tests in the diagnosis of pseudocysts is the blood and urine amylase activity test (Pinkham,[15] David Polowe[16]). Pinkham, in a review and analysis of 10 cases of pancreatic pseudocysts, states that "Persistent elevation of the serum amylase following the signs and symptoms of pancreatitis is significant, indicating the probable development of a pancreatic collection."

It is evident that the blood amylase activity determinations remain as a definitely valuable aid in the diagnosis of acute pancreatitis and pancreatic pseudocyst (Case 1, 8 plus; Case 2, 2 plus; Case 3, 4 plus).

The reaction and ferment concentration of the pancreatic juice after the injection of mecholyl indicates that a test of the external function of the pancreas may well become an important procedure in the diagnosis of pseu-

TABLE 3

Case	Cyst Type by Cause	Anatomic Type	Laboratory Findings									Roentgenologic Findings
			Sugar		Feces: undigested fat muscle fibers	Secondary Anemia	Leukocytosis	Weinberg	Casoni	Blood Amylase Activity	Urine Amylase Activity	
			Urine	Blood								
1	Traumatic pseudocyst	Gastrocolic species (supramesocolic species)	3 gr.	107 mg.	+	+	—	—	—	256 u	512 u	Filling defect of the stomach. Extrinsic pressure and displacement of the stomach and transverse colon
2	"	"	—	123 mg.	+	+	+	—	—	64 u	128 u	"
3	Pseudocyst due to acute hem. pancreatitis	"	—	N	+	+	—	—	—	128 u	64 u	"
4	"	"	—	N	—	—	—	—	—	—	—	"
5	"	"	—	N	—	—	—	—	—	128 u	—	Extrinsic pressure and low lying position of transverse colon. No filling defect on the stomach

docysts and biliary tract diseases. Diagnostic aspiration of the cyst is not advisable. An exploratory laparotomy is almost as simple and much safer.

Differentially, pancreatic pseudocysts must be distinguished from omental or mesenteric cysts, hydronephrosis or cysts of the kidney, retroperitoneal tumors, ovarian cysts, and cysts or tumors of the liver and spleen.

COMPLICATIONS

Occasionally a pseudocyst may rupture spontaneously into the stomach or intestinal tract, especially into the transverse colon and which is suggested by the evacuation from stomach or rectum of a quantity of cyst contents. This complication occurred in our Case 2 which subsequently developed a fatal sepsis and hemorrhage. On the other hand, the rupture may occur into the peritoneal cavity and death from peritonitis may ensue. In a few cases the original pathologic process, chiefly acute pancreatitis or trauma, may have caused such extensive destruction of the glandular tissue that diabetes may gradually develop, rendering the prognosis decidedly unfavorable. Rapid death has been reported in a few cases from the erosion of vessels in the wall of the cyst with consequent massive hemorrhage.

TREATMENT

Previous clinicopathologic studies have shown that the treatment of pseudocysts is definitely one of surgery alone. Three different procedures may be considered:

1. Total excision or radical extirpation.
2. External drainage by marsupialization.
3. Internal drainage, or cystovisceral anastomosis.

Radical complete extirpation is the ideal surgical procedure for true glandular cysts of the pancreas. Unfortunately complete extirpation is not always feasible because of the intimate relationship and dense adhesion of the cyst to the surrounding structures. Other risks which frequently make extirpation dangerous are hemorrhage, the possibility of producing acute pancreatic necrosis or diabetes mellitus or of causing intolerable injury to the intestinal blood supply. Also, the mortality of total extirpation is considerably higher than that of other procedures. According to Heinz-George Rössing, the mortality of radical extirpation is 10.7 per cent. In Guleke's 21 cases it was 9.5 per cent. Therefore, attempts at radical extirpation must be strictly limited to true cysts which can be extirpated, in which case the operation may be undertaken either primarily, when the cyst is small and can be seen to originate probably from a tumor in the pancreatic substance, or secondarily, after marsupialization when the fistula refuses to heal after prolonged drainage.

It is obvious that radical extirpation is neither practical nor advisable in the case of pancreatic pseudocysts since pseudocysts have no proper wall or line of cleavage separating them from the surrounding structures. They are intimately adherent to the surrounding tissues and neighboring organs. External drainage by marsupialization (cystodermal external anastomosis) has become the operation of choice in treating pseudocysts surgically from its suggestion by Gussenbauer in 1882 up to the present time (Table 4). It has been performed in a great many cases without serious complications and with very satisfactory end results. Furthermore, external drainage is a simple and much safer procedure which can be performed in a rather short time with minimal tissue trauma. In the present series the pseudocysts have disappeared rapidly under external drainage and eventually have been closed very satisfactorily. Schmieden, in 1927, reported a series of 95 cases of pancreatic cysts treated by the same procedure and with the same results.

On the other hand, external drainage by marsupialization has not been entirely satisfactory in the surgical treatment of true pancreatic cysts owing to the formation of an external fistula which may persist and drain for a prolonged period. Kehr, and Judd, Mattson and Mahorner reported drainage persisting from a few weeks to two or more years. Other authors have had the same experience. Other complications also may occur, such as excoriation of the skin by the enzymatic activity of the discharge, infection of the

TABLE 4

Case	Type of Cyst	Operative Procedure	Approach	Duration of Drainage	Complication	Cyst Content
1	Traumatic pseudocyst	Marsupialization. Aspiration of cystic content, without drainage	Through the gastrocolic ligament	—	—	2 liters, serous, cloudy exudate. High amylase activity
2	"	—	—	—	Spontaneous rupture into the duodenum and transverse colon, hemorrhages, general sepsis, death	—
3	Postpancreatitic pseudocyst	External drainage by marsupialization	Through the gastrocolic ligament	3 weeks	—	2.5 liters light coffee-colored fluid, 3 ferments of the pancreas, high amylase activity
4	"	"	"	3 weeks	—	2 liters brown bloody fluid, high amylase activity
5	"	"	"	16 days	—	1 liter white, cloudy fluid, high amylase activity

cyst, and sinus and formation of a secondary suppurative process in the cystic cavity. Many methods have been attempted to eradicate the fistula. Wholgemuth advised an antidiabetic diet; Culler[3] used roentgen irradiation; Hamilton[7] used radium; others have treated the direct source and attempted to destroy the lining membrane of the pancreatic cyst, either mechanically or chemically. Schwyzer applied tincture of iodine to the interior of the cystic cavity. Gordin used a sclerosing agent to destroy the membranes of the cyst Doyen dissected out the fistulous track and implanted this track into the stomach or small intestine. This procedure (fistulovisceral anastomosis) has also been performed by others with considerable success.

To overcome the handicap of external drainage Jedlika suggested "primary internal drainage or cystovisceral anastomosis" in 1921. By this method the cyst is anastomosed either to the stomach, duodenum, jejunum, or even the gallbladder. He resected a major portion of the cyst and implanted the remainder of the cyst into the posterior wall of the stomach. Others have followed him by implanting a fistula into the stomach or effecting a cystogastrostomy. Vecche and Jurasz[11] modified Jedlika's posterior cystogastrostomy, performing an anterior cystogastric anastomosis. Kerschner, in 1929, reported cystoduodenal anastomosis. Hahn,[6] in 1927 and Chesterman anastomosed the cyst to the jejunum (pancreatocystojejunostomy or enterostomy). Some surgeons have objected to an anastomosis between pancreatic cyst and the gastrointestinal tract, in the belief that the intestinal contents may enter and lead either to secondary suppuration or to an ac[illegible]n of the enzymes in true par[illegible] they depended on the resorptive power of the gallbladder to remove the fluids produced by the cyst. Hammesfahr[8] and Walzel[17] performed a primary anastomosis between the cyst and the gallbladder (cystovesicular anastomosis, pancreatocystocholecystostomy) and the cystic duct was ligated to prevent reflux of bile. The reason for this ligation is difficult to understand. Neuffer[14] and Achmatowicz[1] performed a similar operation without ligation of the cystic duct. A variety of similar procedures have been performed since, each surgeon making his own modification or form of anastomosis.

CASE REPORTS

Case 1. S. H. C., a white, unmarried male aged 16, a farmer by occupation, came to the clinic on July 24, 1944, complaining of an abdominal mass in the upper left quadrant of the abdomen and of intermittent severe gnawing pain over the same region for the past 3 weeks. Three weeks prior to admission a horse kicked the patient in the upper abdomen. Following the accident severe sharp gnawing pain developed in the epigastrium and upper left part of the abdomen, accompanied by nausea and vomiting. Four days later he noticed a mass in the same area which steadily increased in size. Four or five days before admission he began to have violent attacks of pain and considerable increase in size of the abdominal mass. The antecedent history was noncontributory.

Physical examination showed a large smooth, slightly mobile cystic mass which moved slightly with respiration and which filled the upper abdomen, especially the epigastrium and left hypochondrium, extending about 3 or 4 cm. below the umbilicus. Careful palpation disclosed that the stomach was situated in front of this cystic mass and the transverse colon beneath it.

Laboratory Studies. The urine was yellow, clear, albumin- and acetone-negative, spec. grav. 1025, sugar 3 gr. per liter. *Glucose tolerance* was within normal limits but the blood sugar was 107 mg. per cent in the morning. *Stools* showed no blood or parasites but there were many fat globules and fatty acid crystals, with undigested muscle fibers and starches. The *blood* count showed a definite hypochromic anemia with 3,600,000 red blood cells, 7,400 white blood cells, hemoglobin 60 per cent, color index 83 per cent. Blood amylase test: 38° 30':256—W. U. Urine amylase test: 38° 30':512—W. U.

Fluoroscopic and x-ray examination, after barium meal and enema, showed an extrinsic pressure defect in the stomach between the antrum and fundus, along the great curvature. Lateral film showed the stomach to be displaced by an extragastric mass, lying along the lesser curvature and the posterior wall of the stomach. Barium enema revealed the hepatic and splenic flexures and transverse colon to be particularly low lying due to pressure from the mass (Fig. 2).

The preoperative diagnosis was typical pseudocyst of the body of the pancreas due to traumatic injury.

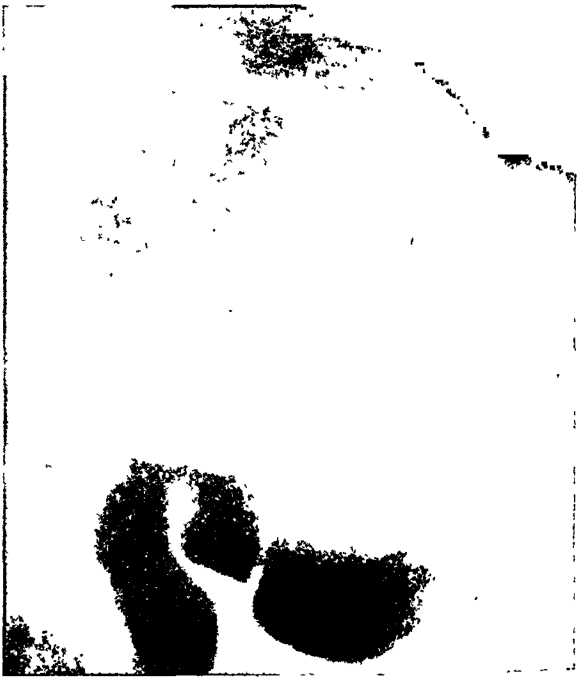

Fig. 2. Case 1, traumatic pseudocyst, gastrocolic species.

After blood transfusion, glucose and saline infusions the patient was taken to surgery on July 31, 1944. Operation was performed by Prof. B. Toker under ether anesthesia and through a supra-umbilical midline incision. On entering the abdominal cavity a large cystic mass the size of a human head was palpated behind the stomach and gastrocolic ligament. The approach was made through the gastrocolic ligament; a large cyst adherent to the posterior wall of the stomach and mesocolon was found projecting from the body of the pancreas. Two liters of white cloudy fluid was obtained from the cyst. The wall of the cyst was marsupialized to the peritoneal surface of the anterior abdominal wall without drainage. Laparotomy incision was closed with white silk and catgut.

Fluid removed from the pancreatic cyst was smoky and contained many red blood cells. Amylase test gave high amylase activity.

Postoperative course was normal. Forty-eight hours after operation an attempt was made to open the cyst through the marsupialized wall, but the cyst had completely disappeared. There was no cystic cavity. The patient was discharged Aug. 26, 1944, with complete relief of symptoms.

Case 2. H. F. F., a white male of 26 years, was admitted to the clinic Dec. 19, 1943, with complaint of soreness and severe attacks of colicky pain over the epigastrium and left upper abdomen accompanied by nausea, vomiting and singultus.

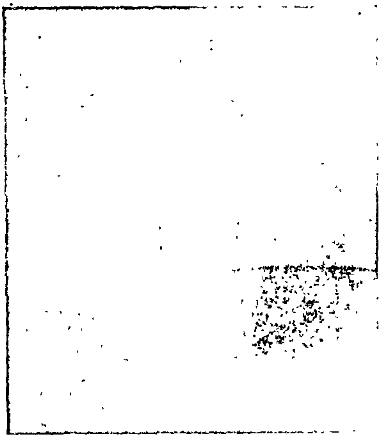

Fig. 3. Case 2, traumatic pseudocyst of the pancreas, gastrocolic species, filling defect in the stomach.

The present illness began suddenly 19 days before admission following blunt traumatic contusion in the midepigastric area (a kick during a fight). There had been severe shock lasting 15 minutes associated with deep fainting and pale, cold, clammy skin and profuse perspiration. Following this, a violent sharp gnawing pain developed in the epigastrium and upper part of the abdomen. The pain radiated to the back and to the left shoulder. The patient awakened during the night with excruciating pain in the abdomen not relieved by morphine. The pain continued, becoming increasingly severe the next day, and was followed by continuous nausea, vomiting, and hiccups. Evidences of shock developed, associated with high temperature, vasomotor collapse and profuse diaphoresis. His general state became progressively worse. At that time there was some tenderness and marked rigidity over the abdomen with gaseous distention of the large and small intestine, accompanied by gaseous and fecal retention. Following a consultation the patient was sent to a private hospital for observation. No operation was performed. He was treated conservatively but with no apparent improvement, the symptoms continuing unabated. The patient was transferred to our clinic 19 days after the onset of his illness.

Fig. 4. Case 2, remarkable extrinsic pressure on the stomach.

Physical Examination. The patient was critically ill with profound anemia and pallor. Temperature was 102.2 degrees F., pulse 146, regular, feeble and respiratory rate between 24 to 32 per minute. Blood pressure was normal. The patient suffered several paroxysmal attacks of epigastric pain associated with severe, persistent vomiting, nausea, and hiccups. This was relieved to some extent by lying flat without a pillow. The urine was dark yellow and bowel function was regular, except for occasional attacks of soapy diarrhea. The abdomen was [illegible] ded with no rigidity, but reboun[illegible] present on pressure over the e[illegible] left qua[illegible] rant. In the ep[illegible] iond there was a large, smooth, tense cystic mass about the size of a child's head which protruded slightly above the abdominal contour. It was extended to about the level of the umbilicus. Palpation and percussion revealed displacement of the stomach to the left in front of this cystic mass and there was evidence that the transverse colon was under the cystic mass. The liver edge was palpated at the costal margin. The spleen and kidneys were not palpable.

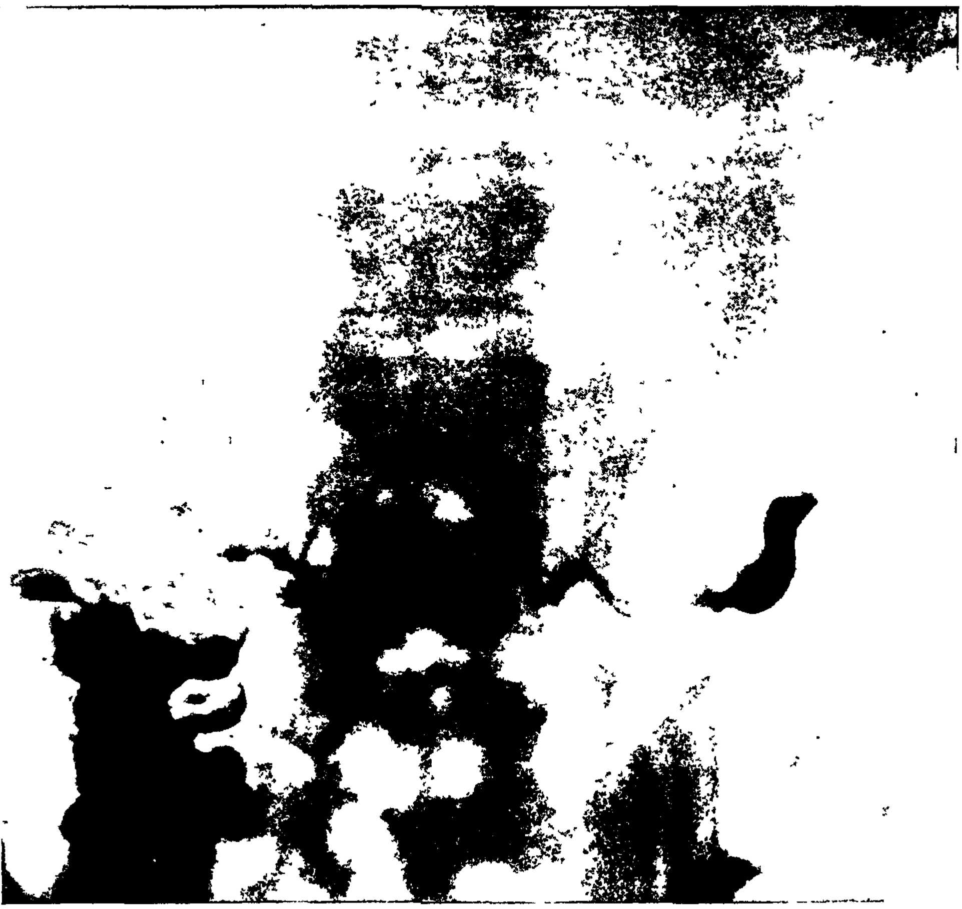

Fig. 5. Case 2, extrinsic pressure by cystic mass and low-lying position of transverse colon.

In view of the history, evolution and clinical findings a provisional clinical diagnosis of traumatic pseudocyst following acute traumatic, hemorrhagic pancreatitis was made.

Laboratory Findings. Urinalysis and fæcal analysis were essentially negative. Blood sugar, 1.23 gr. in the morning. Blood count showed 3,200,000 red blood cells, 12,812 white blood cells. Blood amylase activity test (Wohlgemuth): 38 30- 64U. Urine amylase activity test (Wohlgemuth): 38 30 -128 U.

The increased blood amylase activity found in this case contributed to a diagnosis of pseudocyst of the pancreas and confirmed the clinical diagnosis.

Roentgenologic Examination. A flat plate of the abdomen revealed gaseous distention of the large intestine and evidence of pressure of the transverse colon and hepatic flexure and displacement of the stomach due to extrinsic pressure. Roentgenograms taken after a barium meal and barium enema showed the stomach to be displaced by an extragastric mass lying along the lesser curvature and behind the stomach, and the transverse colon and hepatic flexure to be particularly low-lying due to extrinsic pressure by the mass previously mentioned (Figs. 3, 4, 5).

The persistence and severity of the symptoms and the poor condition of the patient prohibited operation and conservative treatment including measures to combat the shock, dehydration, and low plasma chlorides was adopted. Glucose and saline infusions, insulin, calcium gluconate, cortate, adrenalin and ascorbic acid, sulfonamide and sulfathiazole, and liver extract were administered. Supportive treatment and nursing care were emphasized. The patient improved remarkably under this regimen and surgery was decided upon for the next morning, the tenth hospital day. But at midnight preceding, the patient took a dramatic change for the worse, vomiting and passing continuously liquid watery stools, both of light brown color. On the morning of the eleventh hospital day examination revealed that the large cystic mass had disappeared completely. There was no palpable mass or distention and tenderness in the upper abdomen. Vomiting stopped in the evening but light brown liquid stools continued to be evacuated until the next day. The temperature fell to normal and pulse was 88 and regular. This unexpected complication suggested that a spontaneous anastomosis between the cystic mass and the digestive tract had occurred (pancreato-cystovisceral anastomosis) probably between the cyst and the stomach, the duodenum and transverse colon. The cystic cavity was draining through these anastomoses. In other words, at the onset, this complication was favorable and expectant treatment seemed indicated. The laboratory examination of the vomitus and watery stool revealed a considerable increase in amylase activity and supported the diagnosis of spontaneous rupture of the cyst into the gastrointestinal tract. With improvement of the patient's condition the first day an uneventful recovery was expected, but unfortunately in the succeeding days there was a turn for the worse with fever, singultus, and restlessness Blood culture was positive for *Escherichia coli* and proper treatment was started. But in spite of all treatment, fever and sepsis persisted, hematemesis and melena developed, the course was downhill and the patient died Jan. 14, 1944

Postmortem examination revealed severe traumatic laceration and destruction of the body of the pancreas over the vertebral column, generalized necrosis of pancreatic tissue and ruptured splenic vein in the same area. At the lacerated part of the pancreas, filling the lesser omental sac and situated between the stomach, transverse colon, spleen, and liver was a large cystic cavity (pseudocyst of the pancreas) about the size of a child's head, without a wall or epithelial lining, bounded by the peritoneum of the omental sac and of the adjacent organs. There was an acute generalized secondary infection and suppuration of the cystic cavity (peripancreatic abscess). The cystic cavity had ruptured into the transverse colon in two places and into the duodenum, owing to tryptic digestion. Small erosions and ulcerations were disseminated in the mucous membrane of the stomach; there also were widespread peritoneal and retroperitoneal erosions, marked cloudy swelling and passive congestion of the liver, a few small scattered areas of focal necrosis in the liver. The kidneys showed marked cloudy swelling of the parenchyma.

The pathologic diagnosis was traumatic laceration and destruction of the body of the pancreas, acute traumatic (hemorrhagic) pancreatitis, traumatic pseudocyst of the pancreas, perforation into the transverse colon and into the duodenum, secondary acute suppurative infection of the cystic cavity and formation of peripancreatic abscess due to the communication between the cyst and duodenum and transverse colon.

Case 3. Y. B. H., a white male, aged 35, a farmer, was admitted to the clinic on Oct. 16, 1944, complaining of severe epigastric pain followed by nausea and vomiting and a large abdominal mass in the upper part of the abdomen. The present illness began 45 days prior to admission. The patient had suffered a severe attack of stabbing epigastric pain associated with severe vomiting and nausea. The pain extended to the back and to the left shoulder. It was severe and continuous for the first 24 hours and intermittent for the following days. Nausea was present throughout this period, and the patient vomited occasionally. Twelve hours after the onset of the painful attack, the patient developed a high fever and it lasted several days. Two days thereafter a mass appeared in the left upper quadrant of the abdomen which steadily increased in size during the following days and attained a considerable size prior to admission. He had lost 11 pounds. There was no previous history of gastrointestinal disorders, and bowel function was fairly regular until and during the present illness.

Physical Examination. Examination revealed a well-developed thin, patient acutely ill with profound anemia and pallor. There was marked abdominal distention without rigidity, but with rebound tenderness on pressure over the epigastrium and upper part of the abdomen. In the epigastrium and upper left quadrant there was a large, smooth cystic mass about the size of an adult head which protruded markedly above the abdominal contour and moved slightly with respiration. This cystic mass was extended about 3 to 4 fingers below the umbilicus. Percussion revealed displacement of the stomach to the left in front of the mass, and there was evidence of pressure and inferior position of the transverse colon. The liver, spleen and kidneys were not palpable. There was a definite hypochromic anemia. Increased blood amylase activity favored the diagnosis of pseudocyst of the pancreas, while negative Casoni and Weinberg tests eliminated echinococcus disease.

Roentgenograms after a barium meal and barium enema showed marked anterior displacement of the stomach by an extragastric mass lying behind the stomach, and revealed evidence of pressure on the transverse colon by the same mass (Fig. 6). Clinical and roentgenologic findings and increased blood amylase activity confirmed the diagnosis of pseudocyst of the pancreas due to an acute hemorrhagic pancreatitis.

After the usual preoperative care the patient was brought to surgery on Nov. 21, 1944. The operation was performed by the author. Ether anesthesia was administered and a midline incision was made, extending from the xiphoid process to the level of the umbilicus. The abdomen was opened and a large retroperitoneal cystic mass about the size of a human head was seen and palpated behind the stomach and gastrocolic omentum. The approach was made through the gastrocolic omentum. A large cyst, filling the lesser omental sac and situated between the stomach, transverse colon, and mesocolon was found projecting from the body and caudal part of the pancreas. The cyst was drained of about 2.5 liters of brown, light coffee-colored fluid by suction. Then the cyst was opened and a drain was inserted. The [illegible] marsupialized and the edges of the cavity were sutured to the peritoneal edges around the drain. The abdomen was closed in layers after a piece of the sac wall was excised for biopsy. The postoperative course was uneventful. The cavity continued to drain small amounts of brownish fluid. Ultimately the drain was removed and the patient was discharged six weeks after admission, with complete relief. Biopsy specimen of the cyst wall revealed fibrotic tissue without epithelial lining. Biochemical report on the fluid removed from the cyst showed it to have a very high amylolytic and tryptolytic activity.

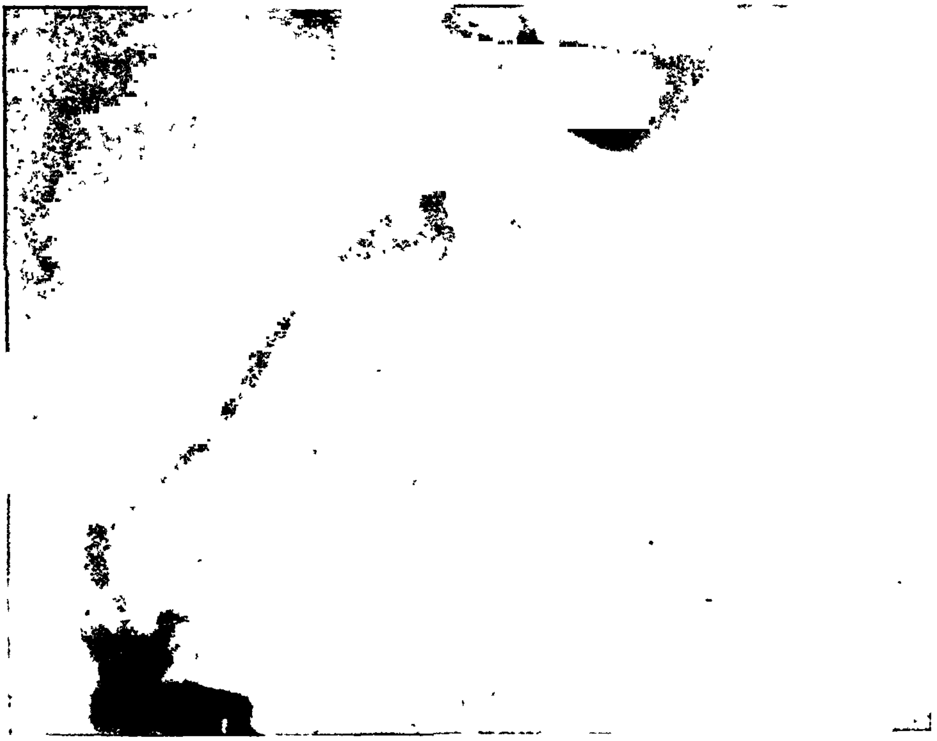

Fig. 6. Case 3, postpancreatitic pseudocyst, gastrocolic species. Remarkable displacement of the stomach.

Case 4. M. A. T., 23 years old, white male, unmarried, clerk, was admitted to the clinic on Feb. 7, 1940, complaining of sudden severe epigastric pain followed by nausea and vomiting, and a large abdominal mass in the upper part of the abdomen of 52 days' duration.

The onset of the present illness occurred 52 days prior to admission with a sudden, very severe, gnawing pain in the upper region of the abdomen, especially in the epigastrium, which extended to the back and to the left shoulder, and was accompanied by severe nausea and vomiting. It was so severe as to prostrate the patient completely for about three hours. Subsidence of this painful attack left him with slight pain and tenderness in the midepigastrium. He was fairly well for the rest of that day, but in the evening, after having eaten heavily and drunk much wine at a banquet, the patient was seized with much more severe pain in the upper abdomen followed by continuous nausea and vomiting. This condition lasted for about three days. The patient was brought to the hospital (Mugla State Hospital) immediately.

Plasmodia were found on clinical and laboratory examination and a diagnosis of malaria was made. Following treatment, he was discharged 10 days after admission. A week later severe epigastric pain associated with nausea and vomiting recurred. A new consultation was held and the patient was readmitted to the same hospital with an impression of acute appendicitis. No operation was performed because of the atypical symptoms which subsided in a few days under conservative treatment. The patient was discharged 10 days after admission.

He was well and symptom-free for 3 to 4 days but then the symptoms recurred. Reexamination revealed an epigastric mass extending to the left hypochondrium. The patient was then transferred to our clinic, 52 days after the onset of the present illness.

Physical examination was essentially negative, except for the abdomen which was soft and asymmetrically distended with no areas of rigidity or tenderness. A large smooth, tense, cystic mass about the size of a child's head was palpable in the epigastrium and the upper left quadrant. It protruded markedly above the abdominal contour and apparently moved with respiration. The cystic mass filled the upper abdomen, especially the epigastrium, left hypochondrium and left flank and extended about 2 fingers below the umbilicus. The cystic mass was surrounded by stomach and transverse colon as judged by palpation and percussion. The liver, spleen, and kidneys were not palpable. It is interesting to note that the size of the cystic mass fluctuated and decreased slightly a few days after admission. Roentgenogram and secretory urogram eliminated hydronephrosis and pyonephrosis but revealed right kidney stones. Laboratory test eliminated echinococcus disease of the pancreas and kidney. Roentgenograms showed the low-lying position of the transverse colon due to extrinsic pressure by the mass previously mentioned. Further fluoroscopic and roentgenographic studies disclosed an extrinsic pressure defect in the stomach between the antrum and the fundus along the great curvature. Lateral roentgenograms revealed that the stomach was markedly displaced to the front by an extragastric mass filling the lesser omental sac and lying behind the stomach. Thus, clinical and radiologic findings and laboratory studies confirmed the diagnosis of pseudocyst of the pancreas due to an acute hemorrhagic pancreatitis.

After the usual preoperative care operation, on Feb. 22, 1940, was performed by Prof. B. Toker and the author. Ether anesthesia was administered and a transverse incision parallel to the costal margin (Körte) was made in the left upper quadrant of the abdomen extending from the costoxiphoid angle to the left hypochondrium. The abdomen was opened and a large tense, cystic mass about the size of a child's head was found behind the stomach and the gastrocolic omentum. The approach was made through the gastrocolic omentum. An enormous cyst filling the lesser omental sac and occupying a position between the stomach and transverse mesocolon extending to the splenic hilus, was found arising largely from the body and the tail of the pancreas. This cyst was strongly adherent to the posterior wall of the stomach and the neighboring organs. The cyst was drained by suction of about 2 liters of brown, coffee-colored, bloody fluid. Then the cyst was opened. There was no epithelial lining. The sac was packed with plain gauze (Mikulicz) and a large rubber drain was inserted. The sac was marsupialized and the gauze was left hanging outside. The abdomen was closed in layers after excision of a piece of the sac wall for biopsy examination.

The postoperative course was uneventful. The cavity continued to drain small amounts of brownish fluid. The gauze, a few days after the operation, and the drain three weeks later were removed. The patient was discharged March 3, 1940, completely relieved, four weeks after admission.

Biopsy of the cyst wall revealed fibrotic tissue without epithelial lining. The biochemical report showed the fluid removed from the cyst to have a very high amylolytic and tryptolytic activity. The amylase activity test, 38°:1111 U.

Case 5. H. K., 27 years old, married white female, was admitted to the clinic on July 25, 1946, complaining of severe pain in the left upper quadrant accompanied by nausea and vomiting and a large abdominal mass in the same region of five years' duration. The first attack, five years prior to admission, lasted one week. Thereafter she had recurrent attacks and remissions. Two months before admission there was repetition of the symptoms and at this time an intraabdominal mass in the same region was noted.

The general physical examination was essentially negative. Local examination disclosed a large smooth, tense tumor mass about the size of a grapefruit filling the left hypochondrium, outlined just below the left costal margin. It seemed to move with respiration. Liver, spleen and kidneys were not palpable. Laboratory examination and tests showed nothing abnormal. Blood amylase activity (Wohlgemuth test) was 128-4 plus.

A flat x-ray plate of the abdomen revealed evidence of pressure at the distal third of the transverse colon and splenic flexure due to an extrinsic tumor mass, showing homogeneous opacity over the left part of the transverse colon. Fluoroscopic examination and roentgenograms taken after barium meal and barium enema revealed evidence of pressure and low-lying position of transverse colon and splenic flexure due to extrinsic pressure by the mass previously mentioned.

Preoperative clinical impression was cyst of the pancreas due to subacute pancreatitis.

After usual preoperative care operation was performed Aug. 2, 1946, by the author. Under ether anesthesia an incision was made over the midline, extending from the xiphoid process to the level of the umbilicus. A large, smooth, tense retroperitoneal cystic mass was found behind the stomach and gastrocolic omentum. The approach was made through the gastrocolic omentum. A large, retroperitoneal cyst filling the lesser sac was found, projecting largely from the tail of the pancreas. It was intimately adherent to the adjacent organs. The cyst was drained of about 1 liter of white, cloudy, fluid by suction, then opened and examined. There was no epithelial lining. The cystic cavity was packed with plain gauze and a large rubber drain was inserted. The sac was marsupialized and the gauze left hanging outside. The abdomen was closed in layers after a piece of the cyst wall was excised for biopsy examination.

Postoperative course was uneventful. The cavity continued to drain for three weeks. The patient was discharged Sept. 7, 1946, with complete relief.

Biopsy of specimen of the cyst wall showed fibrotic tissue without epithelial lining.

Biochemical report showed the cyst contents to have a very high amylase activity—1024—and tryptic ferment and lipase.

SUMMARY

In the light of our clinical observations and pathologic data, external drainage by marsupialization is the procedure of choice in the surgical treatment of pancreatic pseudocysts. From the facts cited it is hardly justifiable to attribute special merit to total radical extirpation or internal visceral anastomosis. Pancreatocystovisceral anastomosis (internal drainage) may be recommended in the surgical management of true pancreatic cysts, when radical extirpation is not feasible.

Various operative procedures for the surgical treatment of pancreatic pseudocysts are discussed.

SUMARIO

El autor hace una revista detallada de los seudo-quistes del pancreas y a base de sus investigaciones clinico-patologicas concluye que el drenaje externo por marsupializacion es el procedimiento de seleccion en el tratamiento quirurjico de estos quistes. El drenaje interno se recomienda en los verdaderos quistes del pancreas cuando su extirpacion no es posible.

SOMMAIRE

L'auteur présente une revue complète des pseudokystes du pancréas. D'après les recherches cliniques de l'auteur et se basant sur la pathologie de cette condition, Berkay conclut que le drainage externe par marsupialisation est le procédé de choix pour le traitement chirurgical des pseudokystes pancréatiques. Le drainage interne peut être employé pour les vrais kystes du pancréas quand l'extirpation de ces kystes n'est pas possible mais ne doit pas être employé pour les pseudokystes pancréatiques.

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Case Reports

Gallstone Obstruction

JAKE SHAPIRA, M.D., AND L. E. WILLIFORD, M.D.
HOUSTON, TEXAS

INTESTINAL obstruction caused by gallstone is a relatively rare finding and as a rule it is rarely diagnosed preoperatively. Certainly it ranks very low on the list of causes of intestinal obstruction. This may be due to the fact that it occurs in the older age groups and usually produces rather sudden and complete obstruction with the result that the patient is acutely ill and toxic from whom it is very difficult to get a clear and coherent history. Mayo and his associates,[1] and a review from the Mayo Clinic [2] agree that a history of chronic cholecystitis is of no value in the diagnosis. Gallstone should be suspected in any case of obstruction occurring in an older person where the cause of the obstruction is obscure. Walters and Snell,[3] Jackson,[4] and Moore [5] all agree that it is the cause in from 1 to 2 per cent of all intestinal obstructions. Arnold [6] states that probably the majority of gallstones erode into the duodenum, but they may erode into the large bowel or into the peritoneal cavity or adjacent tissues. In cases where obstruction is produced a flat plate of the abdomen should help with the diagnosis if the stone is *radiopaque.*

Case 1. Mrs. C. C., a white female of 70, with four living children, was admitted to St. Joseph's Infirmary by ambulance on Oct. 9, 1946. She was complaining of pain in midabdomen, and distention. She had had no bowel movements for the past two days and pain had been increasing for the past two days and had become more localized in the midabdomen on the left side. She had been vomiting for the past 24 hours and had slight fever.

The past history was noncontributory except for the following She had suffered from indigestion all her life and had periodic attacks of vomiting for the past 30 years. She had never been jaundiced and had never had abdominal pain until the previous July. To her knowledge she had had high blood pressure for the past five years. No particular kind of food seemed to affect her "indigestion" and at times anything she might eat might bring on an attack at any time of the day or night. Last July she had an attack with pain in the right lower quadrant and vomiting. An appendectomy was performed. Since that time she has had other attacks of a similar nature and these attacks have grown progressively worse until present attack three days before admission. There was no history of referred pain to either shoulder, nor of pain in the right upper quadrant.

Physical examination revealed an acutely ill white female with distended abdomen. The abdomen was not rigid but was tender about the umbilicus and slightly higher on the right side. Hyperperistalsis was present. No masses were palpable although the edge of the liver was thought to be palpable by one examiner. Vaginal examination was essentially normal. The heart was slightly enlarged and the pulse rapid and regular. Blood pressure was 180/94. The chest was clear. The remainder of the physical examination was essentially normal for her age.

The patient was given intravenous fluids and Wangensteen suction was instituted. X-ray examination showed dilated small bowel loops. Laboratory work revealed mild anemia, normal white count, and essentially normal chemistry. A diagnosis of intestinal obstruction of the small bowel was made with the cause undetermined. Operation, under gas oxygen-ether anesthesia, was performed through a right rectus incision. An obstruction was found at about midileum with proximal loops dilated and distal gut collapsed. The obstruction was caused by an impacted gallstone which was removed through a small longitudinal incision in the bowel wall which was closed transversely with two layers of interrupted chromic catgut. The gallbladder region was a dense mass of adhesions which was not disturbed. After removal of the stone the small bowel was in good condition with good color and circulation.

Sulfanilamide, 5 Gm., and 300,000 units of penicillin were placed in the abdomen and the wound closed in layers. The patient progressed satisfactory for approximately two weeks at which time she had a severe attack of vomiting and vomited eleven gallstones. These are the small stones seen in Figure 1. The large stone on the left was the

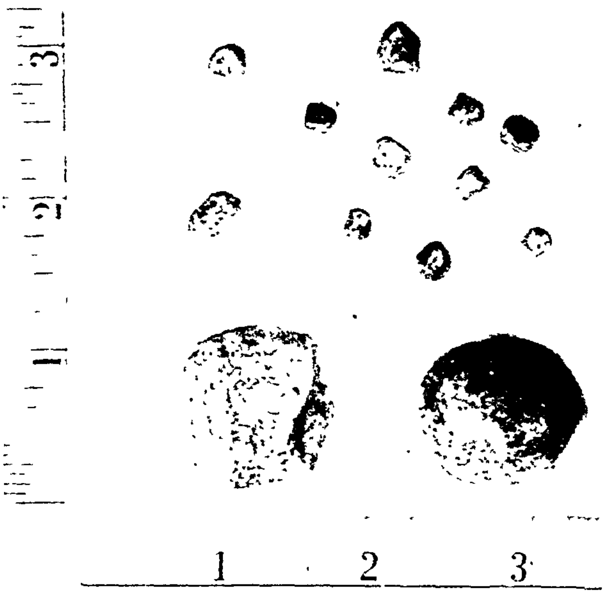

Fig. 1. Calculi vomited by patient.

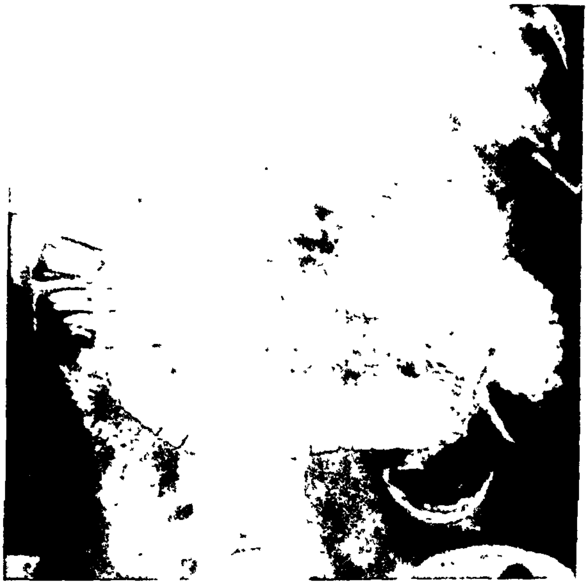

Fig. 2. Roentgenogram after dilute barium.

one causing the obstruction. Following this attack of vomiting she seemed to do well. Dilute barium was administered through a duodenal tube. The radiologist's report was as follows: "The interior of the gallbladder is filled with barium across the cholecystoduodenal fistula and the cystic duct appears to be filled and is seen as a wormlike shadow just above the small gallbladder cavity. The interior of the gallbladder is probably markedly thickened. There is also irregularity of the distal end of the stomach in the region of the duodenal bulb where there is apparently marked inflammatory granuloma or some other process. I am unable to identify in detail the changes seen at the distal end of the stomach." Following this she seemed to get along very well for three days and then began to have more evidence of obstruction as she became distended again and began having some vomiting and passing very little flatus. These signs, together with some pain in midabdomen, became increasingly severe and another x-ray on Nov. 18, 1946, revealed almost complete obstruction again with dilated small gut loops. A Miller-Abbott tube was passed but did not pass beyond the stomach. She was treated with intravenous fluids and a blood transfusion and taken to surgery where a left rectus incision was made. An obstruction caused by another gallstone about the same size as the first one was found at the terminal ileum approximately 18 inches from the ileocecal junction with hugely distended proximal bowel and collapsed distal gut. The bowel wall was not compromised and the stone was removed in a manner similar to the first and the bowel closed. Abdomen was closed in layers and patient returned to her room in good condition. Following this operation the patient made an uneventful recovery except for gross blood in her stools on four days after operation which was believed to come from either the suture line in the bowel or from an eroded vessel in the duodenum. The patient is well and has no complaints at the present time, approximately three months after her final operation. Figure 2 shows the x-ray after the dilute barium was given. Figure 3 shows the x-ray revealing obstruction before final operation.

Case 2. Mrs. J. R., a 58-year-old white female, was seen at the office and gave a typical history of cholecystitis and cholelithiasis. She had had repeated attacks of pain and tenderness in the right upper quadrant for the past 10 years. She had been jaundiced during two attacks. She had indigestion made worse by fatty or fried foods and had had pain in her right shoulder during several of the attacks. Physical examination was negative except for a mass in the region of her gallbladder which was tender to palpation. She was sent into the hospital as an outpatient for gallbladder study. The radiologist reported a stationary calcified area as large as a hen's egg in the region of the gallbladder on all plates. The gallbladder was not visualized by dye. He interpreted this shadow as a large gallstone. The patient was advised to have her gallbladder removed but she refused operation and returned to her home. Two months later she returned to our office with the news that she had passed the gallstone per rectum. She gave us the gallstone which was a typical stone about the size of a large hen's egg, rough and irregular in shape. She was sent into the hospital for another x-ray and the radiologist reported, "the gallstone reported previously is now missing." She has had no recurrences of her pain or jaundice for six months following passing of the stone.

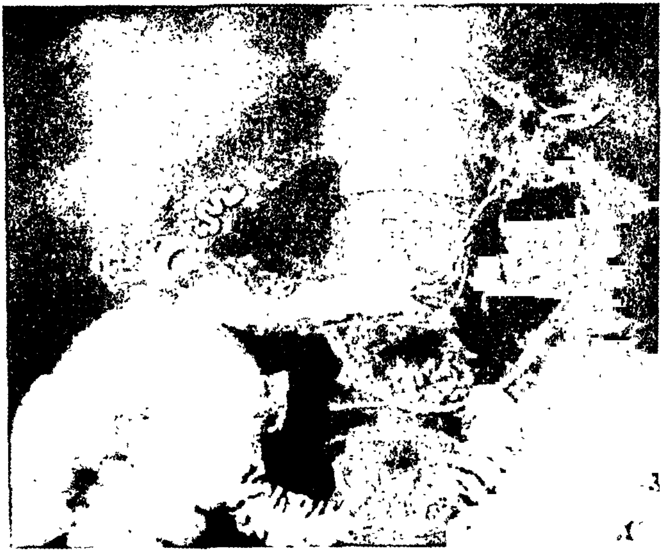

Fig. 3. Obstruction before operation.

COMMENT

Case 1 has several unusual features: 1. We have been unable to find a report of gallstone obstruction twice in the same patient. 2. She vomited 11 gallstones between obstructions. 3. The obstructions were in midileum and terminal ileum and not at the ileocecal junction where most obstructions of this sort are reported to occur. 4. This patient never had upper right quadrant pain. 5. No stones were seen on x-ray examination.

Case 2. Undoubtedly this patient developed a fistula between the gallbladder and the colon and the huge gallstone eroded through and was passed per rectum.

SUMMARY

Two cases are presented in which gallstones were passed orally and per rectum, and which caused obstruction of the small intestine. Gallstone obstruction is somewhat rare and is difficult to diagnose before operation. Relatively small gallstones may produce obstruction if they erode into the small intestine, while very large stones may be passed if they erode into the large bowel. On the basis of two obstructions in the same patient we do not agree with Kalvelage who states that the small intestine with impacted gallstone should be exteriorized, the stone removed and the small bowel closed at a later date. If there is no gangrenous bowel or if the blood supply of the bowel has not been damaged we feel that it should be closed at the time of operation and that an ileostomy should be avoided if at all possible.

SUMARIO

Se han presentado dos caso de calculo biliar que habian producido la obstruccion del intestino delgado y que fueron expulsados uno por la boca y el otro por elrecto.

A base de dos obstrucciones que ocurrieron en el mismo paciente no estamos de acuerdo con las declaraciones de Kalvelage que aconseja la exteriorizacion del segmento obstruido despues de haberse removido el calculo. Si no hay evidencia de gangrena intestinal o de dano a la circulacion del segmento obstruido es nuestra opinion que el debe de cerrarse inmediatamente despues de la extraccion del calculo obstruyente. La ileostomia debe de evitarse lo mas posible.

RÉSUMÉ

L'auteur presente deux cas de cholelithiase dans lesquels des calculs furent rejetés par la bouche et par le rectum et qui furent associes avec une obstruction de l'intestin grêle. Se basant sur deux obstructions chez le même malade, l'auteur prétend que dans les cas de calculs enclavés dans l'intestin grêle, on ne doit pas extérioriser l'intestin. On ouvrira l'intestin et on retirera les calculs biliaires. On réparera l'intestin grêle dans la même séance. Si l'intestin n'est pas gangréneux, si la circulation sanguine n'a pas été endommagée, l'auteur recommande que l'on ferme l'intestin avant de terminer l'operation. Si c'est possible on ne doit pas avoir recours a l'iléstomie.

RIASSUNTO

Descrive due casi di ostruzione intestinale da calcoli biliari. L'A. non e d'accordo con Kalvelage, il quale afferma che l'intestino tenue con calcoli biliari incuneati dovrebbe essere esteriorizzato, il calcolo rimosso e l'intestino rinchiuso in un secondo tempo. Se la gangrena non si e' ancora stabilita e se l'afflusso di sangue nell'ansa intestinale non o' compromesso, l'intestino dovrebbe essere richiuso al momento dell'operazione, evitando un'ileostomia.

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Sección en Español

Evaluación de la Gastroscopía en el Estudio del Cancer Gástrico

WILLIAM E. RICKETTS, M.D.
CHICAGO, ILLINOIS

SUMMARY

In the present study the importance of gastroscopy in the diagnosis of gastric cancer is discussed. Its value depends upon the localization, extension and type of tumor. Gastroscopy is considered of no value in the diagnosis of the diffuse infiltrating retracting type cancer or linitis plastica. Infiltrating carcinomas localized in the middle and lower third of the stomach seldom present any difficulty to gastroscopic diagnosis, but x-rays afford a better diagnosis of the tumors located in the cardia and pylorus. In the differential diagnosis of the ulcerative lesions the analysis of the entire lesion is considered of more importance than the study of particular differential "signs." Gastroscopy is very valuable in the differential diagnosis of the different conditions which may simulate filling defects by x-ray, such as polypoid cancer, the tumoral and nodular forms of "hypertrophic gastritis," the benign polyps and the redundant gastric mucosa.

The diagnostic importance of gastroscopy is great, complementing the x-ray findings in the study of gastric cancer, but it cannot determine the operability of patients with gastric cancer.

La enorme frecuencia del cancer gástrico crea un problema de gran importancia en lo que se refiere a su diagnóstico precoz, permitiendo así la oportuna resección quirúrgica.

Desde el descubrimiento en 1932 del gastroscopio semiflexible por Wolf y Schindler, se han hecho muchos estudios sobre la valoración de la gastroscopia en el diagnóstico del cancer gástrico, muchos de ellos de índole estadística.[1-14] Schindler[14] ha encontrado que usando conjuntamente la radiología y la gastroscopía como medios diagnosticos en las enfermedades del estómago existía un margen de error de solo 3 por ciento y un diagnóstico incierto en un 4 por ciento. Últimamente Ricketts y Pollard[13] en una serie de 1297 casos con 1500 gastroscopias y hallaron asimismo una marcada correlación entre los hallazgos radiológicos y gastroscópicos.

A continuación se discute el valor de la gastroscopía en el hallazgo precoz de las lesiones malignas, del tipo de tumor, de su localización y extensión y el valor de este procedimiento en el pronóstico operatorio de dichas lesiones.

El hallazgo precoz del cancer gástrico es un ideal no alcanzado hasta el momento presente. Se ha intentado el diagnóstico de lesiones precancerosas[15] pero con poca fortuna pues se ha visto que este no es posible con los medios de diagnóstico con que actualmente cuenta la ciencia médica. La palabra diagnóstico "precoz" puede ser interpretada en dos diferentes maneras[16]: la primera como diagnóstico precoz permitiendo "la curación" despues de la resección operatoria. Al presente ni la radiología ni la gastroscopía son procedimientos que puedan llenar este requisito. Cuando aparecen los primeros síntomas clínicos que llevan al enfermo hacia una consulta médica en el mayor número de casos la neoplasia primaria ya ha producido metástasis locales, regionales o distales, dando por resultado una alta recurrencia del mal. El segundo significado de la parabra "precoz" se refiere al diagnóstico de tumores de tamaño pequeño. Usando este segundo significado la contribución de la gastroscopía es de sumo valor como ha sido probado por diferentes autores.[17-19]

En el diagnóstico de las lesiones llamadas [illegible] tales como la atrofia de la [illegible] a la úlcera gástrica benigna [illegible] del estómago existe hoy una [illegible] las dos primeras [illegible] a muchos autores [illegible] mucosa gástrica predispone [illegible] manifiesta que la gastritis [illegible] enfermedad primaria común del [illegible] su prevención sería la [illegible] úlcera y el cáncer gástricos. [illegible] histológicos y patólogicos [illegible] que la gastritis crónica [illegible] sean lesiones precan- [illegible] opina que la gastritis [illegible] enfermedad del estómago [illegible] una condición general [illegible] clínicos y pató- [illegible] que la llamada [illegible] sea producida por [illegible] gástrica. Bene- [illegible] de [illegible] con- [illegible]

[illegible] considerable incluso con metástasis. La frecuencia de la resección del cancer gástrico hoy ha alcanzado el 43.5[27] y 44 por ciento.[28] Frecuentemente es posible apreciar que ciertos tumores de pequeño tamaño producen apenas iniciadas extensas metástasis (tumores de Jarko) y por el contrario ciertos tumores polipoides de gran tamaño no las producen sino muy tardiamente. El criterio de resección gástrica es pues un problema en gran parte dependiente de si existen o no metástasis del tumor gástrico y del tipo de metástasis.

Las lesiones malignas del estómago pueden ser de tipo infiltrante, polipoide o ulceroso. En el examen gastrocópico se debe ser considerar en forma particular la localización, el tamaño, la extensión y el tipo de la lesión.

El tipo infiltrante que es el de peor pronóstico ha sido encontrado por Schindler[29] en el 63.2 por ciento de los casos. La infiltración carcinomatosa puede ser difusa o localizada. En la primera llamada linitis plastica la gastroscopía poco contribuye al diagnóstico, rara [illegible] el gastroscopio puede ser introducido en [illegible] estómago, pues el cardia se encuentra [illegible] do por el tumor. En estos el [illegible] queda pues reservado para [illegible] cer infiltrante de tipo [illegible] stroscópicamente mos- [illegible] lurada, rígida, [illegible] mu- [illegible] nóstico dif [illegible] cial [illegible] sífilis, el [illegible] as- [illegible] hyperr [illegible] la [illegible] el [illegible] la [illegible] e- [illegible] ión [illegible] go [illegible] un [illegible] es [illegible] dos [illegible] con- [illegible] trica [illegible] gnós- [illegible] copía. [illegible] imagen [illegible] ondas [illegible] de la [illegible] diafrag- [illegible] pseudo

Es mas indicado el emplear el término cancer ulcerado que el de úlcera maligna, pues posiblemente todas las lesiones malignas ulceradas han sido desde su inicio cancerosas. El diagnóstico diferencial entre cancer ulcerado y la úlcera benigna del estómago depende de muchos factores, uno de los más importantes es la localización de la lesión ulcerosa. Schindler[30] ha hecho un estudio detallado de los signos en favor de las úlceras benignas y malignas dividiéndolos en cuatro grupos. Estos signos si bien ayudan considerablemente en el diagnóstico gastroscópico del cancer ulcerado ninguno de ellos es sin embargo patognomónico. Al hacer el diagnóstico diferencial de las lesiones muy a menudo se encuentra que los datos de más interes estan no propiamente a nivel de la ulceración sino en la mucosa inmediata a esta. La apariencia *de* la lesión *ulcerosa en conjunto* es de mas importancia que el estudio en particular de estos signos. La gastroscopía realizada por un experto endoscopista es de gran valor en el diagnóstico de las ulceraciones gástricas. Schindler ha encontrado que las úlceras con infiltración gástrica de etiología maligna ocurren en el 17.6 por ciento y aquellas sin infiltración gástrica en el 1* por ciento de los casos.[29]

Las masas polipoides y pseudopolipoides del estómago producen al exámen radiológico una falta de relleno de la imagen de bazio caracteristica. Estas imagenes al exámen gastroscópico pueden ser diagnosticadas corro debidas a diferentes lesiones v.gr.: las formas de apariencia nódular y tumoral de las "gastritis hipertroficas," la poliposis multiple benigna del estómago, los tumores bemgnos del estómago y la mucosa redundante gástrica. El tipo de carcinoma polipoide ha sido encontrado por Schindler con una frecuencia de 2 9 por ciento.

Cuando las lesiones polipoides estas localizadas cerca del cardia el gastroscopio, a menudo no puede ser pasado al estómago. Montier[31] ha individualizado la región yuxtacardiaca en clínica, radiología y gastroscopía, criterio que tiene mucho interés en el diagnóstico diferrencial de las lesiones situadas en el cardia o en las inmediaciones de esta región. Cuando los tumores polipoides estan localizados en el tercio inferior o medio del estómago frecuentemente presentan poco dificultad en el diagnóstico gastroscópico.

La gastritis crónica hipertrófica ocasionalmente se acompaña de un desarrollo considerable de los pliegues de la mucosa gástrica, los cuales producen imágenes radiológicas con falta de relleno que son dificilmente diferenciables de las producidas por un cancer polipoide. En mi experiencia he encontrado de gran valor al hacer el diagnóstico diferencial gastroscópico de esta variedad de gastritis hipertrófica el hallazgo en la una mucosa, con una granulación que semeja las pequeñas piedras de un pavimento y que es característica de las gastritis hipertrófica, en estos casos los pliegues gástricos siguen una dirección paralela al eje mayor del estómago. En la literatura se han descrito *muchos casos de gastritis* hipertrófica los cuales simularon un cancer gástrico el que fué desvirtuado luego histologicamente.[31-38] La gastritis hipertrófica de tipo nódular tiene un aspecto muy particular produciendo nódulos que simular imágenes laculares múltiples del estómago. La mucosa al examen gastroscópico aparece cubierta de eminencias semejando pólipos los cuales pueden alcanzar en ciertos casos el tamaño de una cereza.[39] Los tumores benignos gástrico producen imágenes de dificil interpretación radiológica cuando son confluentes simulando el cancer gástrico. La gastroscopía no solo permite hacer este diagnóstico con gran aproximación sino en algunos casos aun establecer la transformación de un tumor benigno en maligno como fué observado por nosotros en un caso.[13] Schindler [40] ha descrito un signo que el considera de gran valor en el diagnóstico de los tumores benignos gástricos. Este consiste en la presencia de un pliegue de la mucosa en la superficie del tumor reduciendo el espacio que media entre el tumor benigno y la mucosa que lo cubre.

La tercera condición que simula radiológicamente una imagen polipoide debida a cancer, es el prolapso de una mucosa gástrica normal punto el cual no ha recibido énfasis alguno hasta la fecha. En él, los pliegues son de tamaño considerable, especialmente a nivel del antro produciendo radiológicamente una imagen de "papel arrugado." Estos pliegues aparecen y desaparecen con las contracciones del estómago y se borran con la insuflación gástrica. Ultimamente tuvimos la oportunidad de ver tres de estos casos diagnósticados radiológicamente como cancer los cuales en sucesivos exámenes gastroscópicos y radiológicos se mostró definitivamente eran debidos a la presencia de una mucosa gástrica redundante. En estos casos los pliegues formados estaban cubiertos de una mucosa normal, a diferencia de los gruesos pliegues indurados con mucosa de aspecto parimentoso que se hallan en la gastritis crónica hipertrófica.[41] Moersch [42] ha descrito un caso de mucosa redundante del estómago en la cual la lesión fué interpretada gastroscópicamente como cancer y solo en la operación pudo ser establecido el correcto diagnóstica. Cordier y Chevalier [43] han descrito un caso con signos radiológicos sugiriendo un tumor gástrico el cual fué encontrado con la ayuda de la gastroscópia como debidos a un edema del antro pilórico del estómago produciendo un aspecto pseudo tumoral, que los autores sugieren como producido por un edema angioneurótico.

En 1297 casos consecutivamente estudiados por la radiología y gastróscopía, algunos fueron diagnósticados solamente por rayos y otros solamente por la gastroscopía.[13] En el primer grupo hubieron 21 casos. La localización de la lesion fué:

Cardia	1
Tercio medio del estómago	4
Píloro	3
Tercio inferior del estómago	11
Lesión no especificada	2
Total	21

El diagnóstico gastroscópico en estos casos fué:

Gastritis atrófica	6
Gastritis hipertrófica	5
Gastritis mixta: atrófica e hipertrófica	2
Negativo	5
Examen no satisfactorio	3
Total	21

En 7 de estos casos no pudo seguirse la evolución de los enfermos no comprobándose la veracidad de dicho diagnóstico, en tres de ellos el diagnóstico radiológico mostró ser equivocado en la intervención quirúrgica y en 11 pudo ser comprobado. En todos estos casos la lesión cancerosa no fué visualizada o fué incorrectamente interpretada por el gastroscopista.

El cancer gástrico fué diagnósticado en 10 casos por gastroscopía y no por radiología. En uno de estos enfermos el examen histólogico del estómago demostró un proceso benigno, dos no tuvieron comprobación operatoria y en 5 fué comprobada la veracidad del diagnóstico gastroscópico. En estos 5 casos el tumor fué ulcerado en tres, polipoide en uno y mixto en el quinto.

RESUMEN

La importancia de la gastroscopía en el diagnóstico del cancer gástrico debe ser considerada teniendo en cuenta la locilzación de la lesión, su extensión y tipo. En la forma difusa infiltrante neoplástica o linitis plástica el valor gastroscópico es mínimo siendo la radiología el método de elección. Los carcinomas infiltrantes localizados del estómago son en general diagnósticables fácilmente por gastroscopía. La radiología permite una información en mas precisa sobre las tumores localizados en el piloro o en el cardia. El estudio de la apariencia en conjunto de una lesión ulcerosa es considerado de mas valor en la diagnóstico diferencial de las lesiones ulcerosas que el estudio de signos en particular. La gastroscopía tiene gran valor en el diagnóstico de las diversas lesiones que producen una imagen radiológica con falta de relleno de baritado tales como el cancer polipoide, los tipos nodular y tumoral de las gastritis hipertrófica, los tumores benignos y la mucosa redundante gástrica.

La importancia de la gastroscopía como coadyuvante en el diagnóstico radiológico del cancer gástrico es muy valiosa. Se considera que no es posible por la gastroscopía el determinar la operatidad del cancer gástrico.

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El cancer gástrico fué diagnósticado en 10 casos por gastroscopía y no por radiología. En uno de estos enférmos el examen histólogico del estómago demostró un proceso benigno, dos no tuvieron comprobación operatoria y en 5 fué comprobada la veracidad del diagnóstico gastroscópico. En estos 5 casos el tumor fué ulcerado en tres, polipoide en uno y mixto en el quinto.

RESUMEN

La importancia de la gastroscopía en el diagnóstico del cancer gástrico debe ser considerada teniendo en cuenta la locilzación de la lesión, su extensión y tipo. En la forma difusa infiltrante neoplástica o linitis plástica el valor gastroscópico es mínimo siendo la radiología el método de elección. Los carcinomas infiltrantes localizados del estómago son en general diagnósticables fácilmente por gastroscopía. La radiología permite una información en mas precisa sobre las tumores localizados en el piloro o en el cardia. El estudio de la apariencia en conjunto de una lesión ulcerosa es considerado de mas valor en la diagnóstico diferencial de las lesiones ulcerosas que el estudio de signos en particular. La gastroscopía tiene gran valor en el diagnóstico de las diversas lesiones que producen una imagen radiológica con falta de relleno de baritado tales como el cancer polipoide, los tipos nodular y tumoral de las gastritis hipertrófica, los tumores benignos y la mucosa redundante gástrica.

La importancia de la gastroscopía como coadyuvante en el diagnóstico radiológico del cancer gástrico es muy valiosa. Se considera que no es posible por la gastroscopía el determinar la operatidad del cancer gástrico.

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Editorial

Reactions to Intravenous Infusions

THE recent recall by a dependable pharmaceutical house of a batch of dextrose distributed for intravenous administration again focuses attention on the problem of reactions to intravenous infusions. Aside from such unfortunate incidents as contaminated commercially produced material, the fact should not be overlooked that instances of reactions may occur sporadically in hospitals, such incidents apparently being unrelated to the commercial product used. This problem has not received the attention it deserves from those responsible for the setting-up of hospital laboratory technics for the proper care of laboratory wares and equipment. Such equipment frequently is left to the care of relatively untrained laboratory assistants or undergraduate nursing personnel who through no fault of theirs lack the background knowledge necessary properly to evaluate the problems involved.

The concept of a pyrogenic substance produced by bacteria was established by Seibert[1] who showed by animal experimentation that the compounds she named "pyrogens" were the product of bacilli belonging to Jordan's Group XI, usually present in river water. Rademaker[2] found them in varying numbers in tap water in numerous cities, their number varying with the seasons. Following the work of Seibert other investigators demonstrated that a number of organisms, pathogenic and nonpathogenic, were capable of producing pyrogens, though all that is known is that pyrogen is a proteinlike substance containing nitrogen and is of alkaline reaction. The commercial production of pyrogen-free intravenous solutions was the result of applying the principles evolved by Seibert in 1924 and which were added to by Rademaker in 1930. In spite of this, reactions continue to occur, and almost two decades after the first principles for the prevention of such reactions were set forth, they have been repeated and enlarged upon.[3]

That the commercial solutions cannot be blamed in all instances of reaction following intravenous infusion has been shown beyond a doubt. According to Rademaker, the blame falls more often than suspected on those responsible for the care of glassware and equipment in individual hospitals. Since tap water has been shown to be a source of contamination it would seem clear that it is folly to wash and rinse glassware and tubing in tap water and store it without sterilization since Rademaker found that pyrogen can be developed within two hours at room temperature in the drying films of moisture remaining in such tubing and equipment. "Indeed, a sufficient amount of pyrogen can be formed within an intravenous needle rinsed in tap water to produce a reaction." Furthermore, the extreme solubility of pyrogen accounts for the ease of reaction when pyrogen-free solutions are run through contaminated needles, tubing, etc. Rademaker suggests as an added safeguard that 50 to 100 cc. of pyrogen-free solution be run through the intravenous set and wasted, before inserting the needle into the vein. In other words, it is not the tubing itself that is at fault, but the film of water remaining after rinsing. If disposable tubing is not available it is recommended that "careful cleansing of tubing be followed by rinsing two or three times with pyrogen-free distilled water and *immediate* sterilization." Needles, also, should be cleansed and sterilized at once. To allow needles to stand for some time before sterilization, whether by boiling or autoclaving, favors pyrogen formation. The same principles apply to the care of glassware and other equipment. In the case of solutions prepared in hospitals, "proper preparation into pyrogen-free glassware with immediate sterilization still are the criteria in the production of pyrogen-free solutions." Following preparation of these solutions the distilling apparatus should be cleansed immediately, and cleansed again at regular intervals. Since in hospitals the biologic assay method of testing solutions is not employed, the first indication of contaminated solutions is the occurrence of a number of reactions.

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[1] Seibert, F. B.: Am J. Physiol. 67:90, Dec. 1923; *Ibid.* 71:621 Feb. 1925.

[2] Rademaker, L. A.: Ann. Surg. 92:195, Aug. 1930.

[3] Rademaker, L. A.: J. A. M. A. 135:1140, Dec. 27, 1947; J. Internat. Coll. Surg. 11:194, Mar.-Apr. 1948.

It seems apparent, then, that in hospitals the principal source of reactions may be improperly cleansed and sterilized intravenous equipment. Obviously, responsibility lies with those entrusted with the training and supervision of personnel caring for such equipment to see that this personnel has the proper understanding of the factors involved in the production of reactions to intravenous infusions.

L. G.

Sixth International Assembly, International College of Surgeons, Rome, May 16 to 23, 1948

The scientific sessions, as well as the exhibits, were held in the Policlinico of the University of Rome. Representatives from almost every part of the world attended. The scientific program and the social functions were an unqualified success.

A special Committee on the History of Surgery was presided over by **Prof. A. Pazzini**, Director of the Institute of History .and Medicine at the University of Rome, and a Committee presided over Exhibits of Modern Surgery.

A Ladies' Reception Committee arranged for the complete and delightful entertainment of wives and guests of visitors.

During the Assembly one thousand members of the International College of Surgeons and their families were received in the **Vatican** by **H.H. Pope Pius XII** who delivered a special message to the Assembly.

Honorary fellowships in the International College of Surgeons were conferred upon Prof. Rafaele Paolucci and Prof. A. Mario Dogliotti.

Following the Assembly in Rome, those in convention proceeded to **Turin** for three "**Surgical Days**" to honor the memory of the great Italian surgeons, Profs. Donati, Carle and Uffreduzzi, under the presidency of Prof. A. Mario Dogliotti. The scientific papers, clinics, and receptions at Turin were exceptionally brilliant and were a fitting complement to the Assembly in Rome.

The following were in charge of the Assembly:

Honorary President, Dr. Rafaele Bastianelli, Rome
Presidents, Dr. Rafaele Paolucci, Rome; Dr. A. Mario Dogliotti, Torino
Vice-Presidents, Dr. C. Marino Zuco, Rome; Dr. E. Mingazzini, Rome; Dr. G. Pieri, Udine; Dr. P. Valdoni, Rome
General Secretary, Dr. Giuseppe Bendandi, Rome

Proceedings, House of Delegates, International College of Surgeons

First Session

Transactions and Minutes of the House of Delegates

1. Call to Order:

In the absence of Dr. A. A. Berg, who was prevented from presiding by a previous important appointment, the meeting was called to order by Dr. Francisco Graña.

2. Roll Call:

In addition to a quorum of voting officers, trustees and delegates, a large representation of delegates and members from many countries also was present.

Among the communications received was a letter from the Surgeon-General of the United States Navy which read as follows:

"To the Members of the International College of Surgeons with International Assembly, Rome, Italy:

"The Bureau of Medicine and Surgery is honored by your invitation to participate in the Sixth International Assembly of the International College of Surgeons and presents its exhibit, 'Highlights of Military Surgery in World War II.'

"In essence, the outstanding accomplishments of Medical Science during this period are directed to advances in our transportation of casualties and the widespread use of whole blood and antibiotics.

"Their use not only immensely broadened all fields of surgery but resulted in significantly low mortality rates never before achieved.

"The medical and surgical accomplishments of World War II are now dedicated to peace.

"Physicians of every land and creed once again join in alleviating human suffering everywhere.

"The Bureau of Medicine and Surgery salutes the International College of Surgeons in its worldwide endeavor to extend the advances of medical science to all mankind."

(Signed) C. A. Swanson
Rear Admiral M.C.
Surgeon-General U. S. Navy

3. Approval of Minutes:

The Minutes of the Meeting of the House of Delegates of March 27 and 28, 1946 (Lima, Peru), and of all interim meetings and transactions of the Executive Council and International Board of Trustees from March 27, 1946, to date, were fully approved, ratified and confirmed by vote of the House of Delegates.

4. Appointment of Committee on Nominations:

Dr. Graña appointed the following Committee on Nominations for consideration of candidates for International offices:

Dr. Harry E. Bacon	United States
Dr. Aurelio Diaz Ufano	Peru
Dr. Francisco Fonseca Garcia	Mexico
Dr. Endre Hedri	Hungary
Dr. Felix Mandl	Austria

5. Reports of Officers:

Reports of the Treasurer and Secretary were read and approved.

6. Reports of Committees:

Reports of the Chairmen of the Committee on Foreign Affairs; Publications Committee; Assembly Committee; and of the Editor of the Journal were read and approved.

Upon motion duly made and seconded, the House of Delegates voted that, if possible, beginning with January, 1949, the Journal would be published monthly instead of bimonthly.

7. Introduction of Resolutions:

The following Resolutions and Amendments to the **Constitution and By-laws of the International College of Surgeons** were presented, to be voted upon at the Closing Session of the House of Delegates:

RESOLUTION 1

It was moved that Section 6 of Article III of the By-laws of the International Constitution (page 16) be amended to read:

Section 6. It shall hold a minimum of four meetings a year and at such other times as may be necessary, subject to the call of the President or on petition of four members of the Board, and such petition to the President by four members of the Board shall make it mandatory that a meeting be called.

RESOLUTION 2

Whereas, it is not the intention of the International College of Surgeons to conflict with the existing laws of any country, state or dominion in which it shall have Chapters,

Be It Resolved that the Constitution and By-laws of the International College of Surgeons be amended by the insertion of the following paragraph to be known as Section 7 of Article II on page 9 of the Constitution of the International College of Surgeons:

"Should it become essential, by reason of existing laws of any state, country or dominion, that local incorporation of a chapter is necessary in order to comply with the laws of that particular state, country or dominion, such incorporation shall in no way affect or change or modify the sense of Section 6 of the Constitution of the International College of Surgeons."

RESOLUTION 3

Whereas Article I, Section 6 of the By-laws of the International Constitution gives power to members of the House of Delegates and the International Board of Trustees and the Executive Council to vote by proxy, and

Whereas such proxies are often taken advantage of,

Be It Resolved that the President of the College appoint a committee of three to look into the matter, and to suggest to the Board of Trustees changes in regard to proxies if such changes are needed or desirable in the interests of the College.

RESOLUTION 4

Whereas, according to the Constitution and By-laws of the International College of Surgeons, the members of the International Board of Trustees are elected biennially, each for a two-year term, thus creating vacancies in all offices simultaneously, and

Whereas, such procedure is undesirable in that all Trustees are new in office and unacquainted with business, procedures, etc., and

Whereas, in similar organizations a so-called staggered term of office has been adopted to alleviate this difficulty,

Be It Resolved that the members of the International Board of Trustees of the International College of Surgeons be elected to serve in the *following manner: one-third to serve for two* years; one-third to serve for four years; and one-third to serve for six years.

Be It Further Resolved that said procedure be adopted by amendment to the Constitution and By-laws of the International College of Surgeons.

RESOLUTION 5

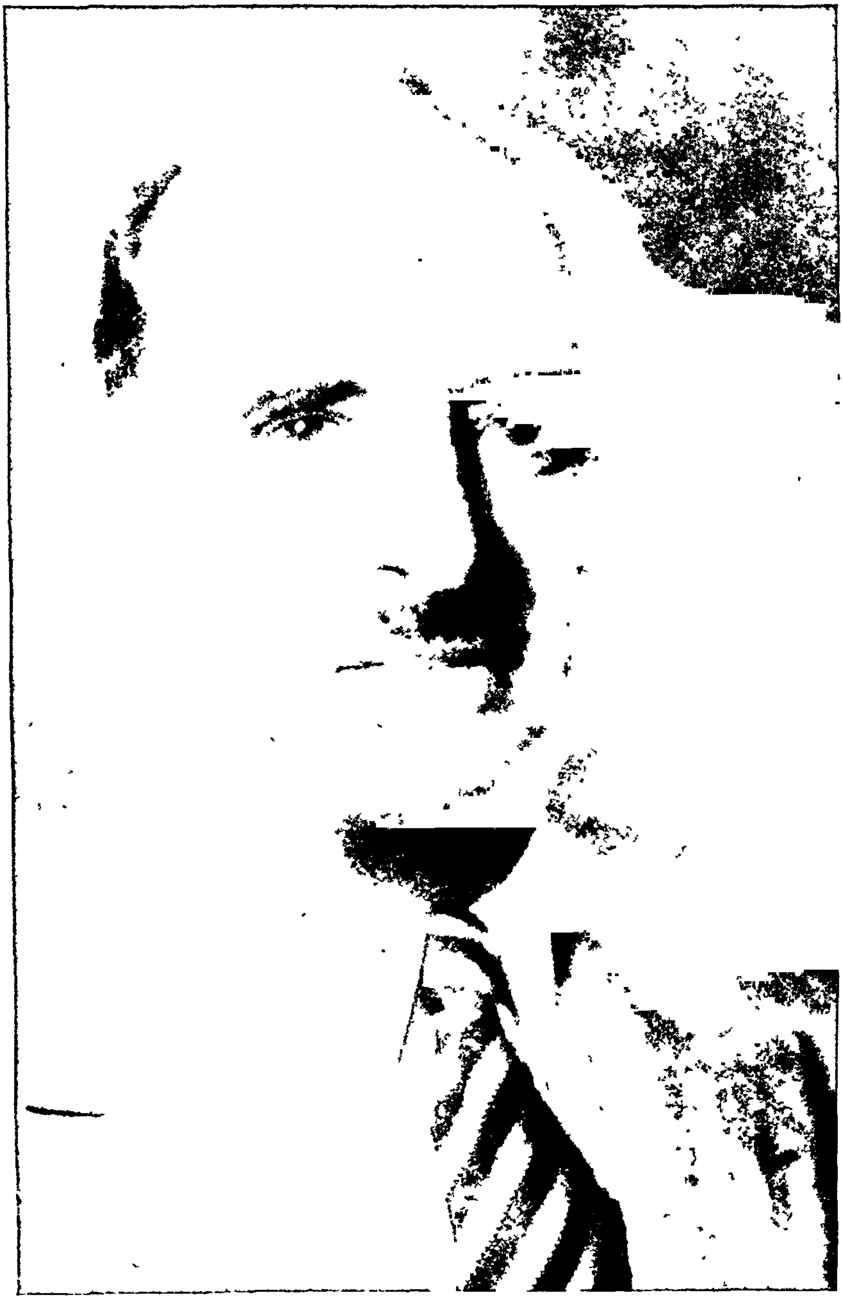
Resolutions were introduced to amend the Constitution and By-laws of the International College of Surgeons, printed in 1947, as follows:

Article III, page 9, should be changed to read:

"Of the fees and dues collected by any component chapter 60 per cent shall remain the property of the chapter, and the balance of 40 per cent shall be the property of and be remitted to the Treasury of the College."

In Article X, Section 1, page 13, should be inserted after the word "Constitution": ". . . with the exception of the Preamble and Articles I and II, and Sections 1, 2, 3, 4, 5 and 6 of the latter."

Article X, Section 2, page 13, should read, after the word "amended": ". . . with the exception of the Preamble and Articles I and II and



Francisco Graña, M.D., F.I.C.S., F.A.C.S.
President of the International College of Surgeons

Sections 1, 2, 3, 4, 5 and 6 of the latter."

In Article II, Section 2 of the By-laws, page 15, the following changes should be made:

Line 9, after the words "for any reason," insert "or in his absence,";

Line 12, after the words "such duties," insert "or if for any reason that is not possible,";

Line 13, delete "Board of Trustees" and substitute "First Vice-President."

Herbert Acuff, M.D., F.I.C.S., F.A.C.S.
President-Elect of the International College of Surgeons

In Article II, Section 4 of the By-laws, column 2 on page 15, the following changes should be made:

Line 7, after the words "Executive Council" insert the word "he";

Line 11, delete "he may" and substitute "the Executive Council shall";

Line 13, after the word "purpose" insert the words "the Treasurer";

Line 17, delete the words "usually pertain to his office" and substitute "as are assigned to him by the Board of Trustees."

Article VIII, Section 3 of the By-laws, page 17, should remain as it is up to and through "$25.00" (fifth line) and the rest of that Section should be deleted. At the end, add: "The subscription price of the Journal shall be determined by the Executive Council."

RESOLUTION 6

Whereas, the growth of the College and its Chapters is self-evident, and

Whereas, representation on the International Board of Trustees by these new Chapters seems desirable,

Be It Resolved that the number of members of the International Board of Trustees be increased from forty-one to forty-seven, and that Article VII, Section 2 of the Constitution and By-laws, relating to membership of the Board of Trustees, be changed accordingly.

RESOLUTION 7

Whereas, a number of persons have been greatly instrumental in bringing this Sixth International Assembly of the International College of Surgeons to a high degree of success and perfection, be it resolved that letters of thanks be sent to all whose efforts contributed to the occasion.

8. Submission of Invitations for the Next International Assembly.

Invitations were received to hold the Seventh ternational Assembly in various parts of the orld, the most consideration being given to one from the Mayor of the City of Vienna, and one from the Argentine Government. After discussion, and because the invitation from the Argentine Government was received prior to that from the Mayor of Vienna, it was decided that the Seventh International Assembly would be held in Buenos Aires, Argentina, in 1950, cordial thanks being extended to countries from which invitations had been received.

9. Miscellaneous Business.

The Secretary presented the petition of the Philippine group for a Charter, and asked the approval of the House of Delegates. Said petition was unanimously approved.

The Opening Session of the House of Delegates adjourned at 1:45 P.M.

Closing Session

The Closing Session of the House of Delegates of the Sixth International Assembly of the International College of Surgeons was called to order by Dr. A. A. Berg in the Policlinico of the University of Rome, on May 17, 1948, at 10 A.M.

A large representation including surgeons from Argentina, Austria, Bolivia, Canada, Chile, China, Cuba, Egypt, England, Finland, France, Haiti, Hungary, India, Italy, Mexico, Peru, Puerto Rico, Philippines, United States and Turkey, were present. A quorum of voting Officers, Trustees and Delegates answered the roll call, and Dr. Berg declared the meeting open for the transaction of business.

1. Unfinished Business of Preceding Session:

Dr. A. A. Berg gave his address as retiring President, from which limitations of space permit us to quote only the following:

"The frightful ravages of war have not interfered with our meetings, and we are exceedingly proud that at the last meeting in New York City during the war years, we brought to the surgeons of the Allied Armies stationed in the United States the latest and best practices in diagnosis, technic and treatment that science and experience afforded."

Dr. Berg explained the functions of the College, which are well known to all, warned against overtraining in our profession, and questioned whether the lengthy training that is demanded is essential except for specialists. "Is all this desirable or necessary? Did Ambroise Paré or Galen or Hunter or Lister or Billroth or Schimmelbush or Bastianelli or Putti or McDowell or Keen, have all these qualifications?

"Were these great surgeons made according to a set plan, or were they surgeons whom the Creator had touched with the divine spark of genius? How many young men today are excluded from the ranks of surgical organizations because they could not attain certain qualifications even though they have education, culture, imagination and genius? There is room here for our influence to be exerted, to bring light out of this turmoil and confusion." . . . "I see the future of this College in the years to come growing ever wider and wider, stronger and stronger, for we are brothers, workers all, ever reaping something new, earnest of the things that we will do."

2. Approval of Resolutions Presented in the Opening Session.

The Secretary read the Resolutions and Amendments presented at the Opening Session, and moved that all said Resolutions and Amendments as read and reread at this the Final Session, be approved, confirmed, ratified, and incorporated into the Minutes of this meeting and in the Constitution and By-laws of the International College of Surgeons. The motion was seconded and unanimously carried.

3. Miscellaneous Business.

The Secretary presented a letter from Prof. A. Pazzini, professor of the History of Medicine at the University of Rome, who offered his cooperation in formulating plans for the establishment of a Museum of the History of Surgery at the Home of the College. This was unanimously approved, and the President announced that a Committee would be appointed to look further into the matter for a detailed evaluation of the plan.

The Secretary read a letter from Dr. William Carpenter MacCarty, Sr., of the Mayo Clinic, Rochester, Minnesota, in which he offered his services without remuneration to the International College of Surgeons as Field Representative, and outlined a plan of activity in that capacity.

Dr. MacCarty's offer was accepted with gratitude by the House of Delegates, details of his duties to be worked out later.

Election of Officers: The following officers and trustees were unanimously elected:

President, Dr. Francisco Graña, Lima, Peru

President-Elect, Dr. Herbert Acuff, Knoxville, Tennessee

Treasurer, Dr Roland M. Klemme, St. Louis, Missouri

Vice-Presidents: Dr. Rudolph Nissen, New York, N. Y.; Dr. Manuel A. Manzanilla, Mexico City; Dr. Custis Lee Hall, Washington, D. C.; Mr. Hamilton Bailey, London, England; Dr. Raffaele Paolucci, Rome, Italy; Dr. Lyon H. Appleby, Vancouver, Canada; Dr. Felix Mandl, Vienna, Austria

Trustees: Dr. Lyon H. Appleby, Vancouver, Canada; Dr. Fahri Arel, Istanbul, Turkey; Dr. Charles H. Arnold, Lincoln, Nebraska; Dr. W. Wayne Babcock, Philadelphia, Pa.; Dr. Raffaele Bastianelli, Rome, Italy; Dr. Moses Behrend, Philadelphia, Pa.; Dr. Jacob Bitschai, Alexandria, Egypt; Dr. Alfredo Borjas, Caracas, Venezuela; Dr. Martial Bourand, Port-au-Prince, Haiti; Dr. Felipe Carranza, Buenos Aires, Argentine; Dr. Jorge Cavalier, Bogota, Colombia; Dr. Alejandro Ceballos, Buenos Aires, Argentine; Mr. Zachary Cope, London, England; Dr. R. N. Cooper, Bombay, India; Brig. Gen. M. M. Cruickshank, Aberdeen, Scotland; Dr. Raymond Darget, Bordeaux, France; Dr. Justin Djanceledze, Leningrad, U.S.S.R.; Dr. A. Mario Dogliotti, Torino, Italy; Dr. Francisco Fonseca Garcia, Mexico City; Dr. Jorge de Gouvea, Rio de Janeiro, Brazil; Dr. Endre Hedri, Budapest, Hungary; Dr. Elmer Hess, Erie, Pennsylvania; Dr. Oscar Ivanissevich, Buenos Aires, Argentine; Dr. Arnold Jirasek, Prague, Czechoslovakia; Dr. Kalle Kallio, Helsinki, Finland; Dr. J. Heng Liu, Shanghai, China; Dr. Wm. Carpenter MacCarty, Sr., Rochester, Minnesota; Dr. Felix Mandl, Vienna, Austria; Dr. Alfredo Monteiro, Rio de Janeiro, Brazil; Dr. Cesare A. Pantoja, Bogota, Colombia; Dr. Esteban Paulin, Queretaro, Mexico; Dr. Desiderio Román, Philadelphia, Pa.; Dr. Raul David de Sanson, Rio de Janeiro, Brazil; Dr. James K. Shen, Shanghai, China; Dr. Enrique St. Loup B., La Paz, Bolivia; Dr. Alex Spain, Dublin, Ireland; Dr. Miklos Temesvary, Budapest, Hungary; Dr. Manuel Tuason, Manila, P. I.

5. New Business.

Charters were accorded by the President to the Austrian and Philippine Chapters, who were welcomed into the International College of Surgeons.

The Closing Session of the House of Delegates adjourned at 3 P.M.

Thirteenth National Assembly, United States Chapter International College of Surgeons, St. Louis, Nov. 16-19, 1948

Drs. Roland M. Klemme and Vernon Mastin announce the thirteenth Annual Assembly and Convocation of the United States Chapter, International College of Surgeons, which is to be held in St. Louis from November 16 to 19, 1948.

Headquarters will be at the Kiel Auditorium. The program of scientific sessions on subjects in the fields of general surgery; eye, ear, nose and throat surgery; gynecology and obstetrics; urology; and orthopedic, thoracic, plastic, and neurologic surgery, will be supplemented by operative and nonoperative clinics in hospitals in St. Louis and vicinity.

In addition there will be extensive technical and scientific exhibits, as well as the showing of operations by motion pictures and, if possible, by television.

At the Convocation, which will be held on the final evening of the Assembly, a large group of surgeons will be received as Affiliates, Matriculates. Associates and Fellows.

The Committee on Arrangements plans that "International College Week" in St. Louis will be full to overflowing with activity. Sunday and Monday, November 14 and 15, the annual business meeting will occupy the attention of the officers of the College. Monday the hospitals of St. Louis will act as host to surgical operative clinics. Tuesday the scientific sessions will begin and continue daily through Friday. Tuesday evening the United States Chapter will be guests of the St. Louis Medical Society. Wednesday night a "Surprise Session" is planned. On Thursday night the Annual Banquet, and on Friday evening the colorful Convocation ceremonies will take place.

Entertainment for the surgeons' ladies will continue throughout the week.

An unusually fine technical exhibit will be presented by leading manufacturers of surgical instruments, x-ray apparatus, operating room and hospital equipment, pharmaceuticals and others.

Watch for the October issue of the JOURNAL *of the International College of Surgeons for detailed information on the program, but plan now to attend this meeting.*

For applications for membership in the United States Chapter, International College of Surgeons, address Dr. L. J. Gariepy, Secretary, 16401 Grand River Ave., Detroit, Michigan.

Identification of Tumors. By N. Chandler Foot, Philadelphia, J. B. Lippincott Company, 1948. This volume meets the need for a shorter book that will afford a concise but sufficiently adequate concept of the salient gross and microscopic features of the various neoplastic tumors of the human body.

The text has been systemically compiled. If the tumor is of general distribution, it is considered in the earlier chapters dealing with such growths. If it is peculiar to a certain organ, it is included in the later chapters dealing with tumors classified according to the various anatomic systems (alimentary, respiratory, etc.). The preferred name of each growth is presented, together with its less familiar synonym. Information regarding the tissues from which each variety originates, its usual site of incidence, age and sex of the patient it commonly afflicts, and any exceptionally important signs and symptoms, are then noted. Following this, there are short descriptions of the gross and microscopic features which permit recognition and diagnosis together with any variants which sometimes occur. Finally, the analogue of the tumor under discussion is indicated when it is not fairly obvious.

There are many superficially similar histologic appearances in the manifold tumors which afflict the human body; and, whenever any possible confusion may occur, the differential points in diagnosis are indicated. In this regard, the matter of specific and/or special staining and impregnation methods are considered and directions are given for carrying them out.

In Part 1 there are sections for tumors of fibrous tissue, cartilage and bone, muscle and fat. These are mesoblastic tumors. Other sections discuss tumors of the serous membranes, of the cardiovascular system, of epithelial tissues and of lymphoid tissue. Tumors of the spleen are included in the first section because of its multisystem construction.

Since Part 2 contains the descriptions of the tumors of the special systems and organs, the reason for the inclusion of tumors of the spleen and of the cardiovascular system in the first part of the book seems a little obscure. In Part 2 will be found tumors of the respiratory system and of the mediastinum, alimentary canal, liver, pancreas and biliary tract, and urinary system. There is a large section devoted to tumors of the organs of internal secretion. Tumors of the male and female reproductive system and of the breast are discussed independently. Tumors of the nervous system and of the skin comprise the next two sections. The book finally describes tumors of the eye and of the ear. There is a tabulator index of tumors and a general index at the end of the book.

This volume is intended to serve as a brief guide to the identity of tumors and to stimulate the further study of them. It contains no extended discussions as to theories of origin, no statistical tables, few clinical data and no lists of references. The author has pared its contents down to the very essentials necessary for the identification and the diagnosis of a given tumor with occasional references to other items. This has necessitated a rather arbitrary and didactic approach which, under circumstances, must be understood. For these many reasons the book is naturally somewhat limited, but it has a place for the beginner or for those with limited knowledge and experience with tumors in general. The deficiency is remedied, however, because suggestions are given whereby the reader can readily find larger and more comprehensive descriptions in the more inclusive textbooks, or in other monographic publications.

The format of the book is excellent. The text is well arranged and distributed. There are abundant well placed photomicrographic illustrations in black and white of each histologic type of tumor. When feasible and possible, the widely different appearances of a given tumor are so illustrated. Gross photographs are not provided and the reviewer agrees with the author that in a condensed book of this type they would add nothing of value.

Nouvelles Techniques de Traitement des Fractures. By H. Godard et R. Michel-Bechet, Goin & Co., Paris, 1948. This is a very concise and comprehensive volume covering all the major fractures with special emphasis on their treatment. There is, however, quite a tendency towards oversimplification.

As all French books, it is clear and brief. Several topics such as fractures of the hand are completely overlooked. Newer methods such as that of Kutsher's intramedullary pegging have been given ample consideration, perhaps more than they should have.

Operative Gynecology. By Josef Halban, edited by Luben Tr. Panoff, Vienna, Urban & Schwarzenberg, Ed. 2, 1947. The first edition of Prof. Josef Halban's book was published in 1932. Following the death of the author Doctor Panoff undertook the task of reediting the work. The publisher requested that "the character of the book should be strictly preserved," and that the editor's duty should be "confined to elimination of obsolete procedures, correction of obvious errors, and to short hints at newer discoveries." This request was followed a little too well. One searches in vain for any mention of the paramount discovery of penicillin. Also, the old direct method of blood transfusion is still adhered to.

In comparing this work with the two standard American textbooks on the subject, one finds the scope of operative gynecology greatly extended. In a book of this type one would not expect a chapter describing in detail Trendelenburg's pulmonary embolectomy, nor can nephrectomy be justly classified as a gynecologic operation.

In dealing with congenital absence of the vagina, Baldwin's and Schubert's methods are set forth in detail. "Both of these operations have higher mortality than can be justified by the condition" (Te Linde), and therefore have been abandoned in this country. The methods of neither Falls, Graves, nor McIndoe are mentioned.

The chapter on malposition of the uterus is worth-while reading. The author advocates treating retrodisplacement of the uterus by fixation of the uterus to the bladder either by the abdominal route (Werth) or through a vaginal incision (Mackenrodt-Halban). Both operations have the purpose of obliterating the vesicouterine space and are recommended in those cases where future pregnancies are desired.

The various forms of treatment of prolapse are depicted. In doing an anterior colporrhaphy, the author plicates the prevesical fascia by a single pursestring suture, which most surgeons in this country would deem insufficient to insure permanent support of the bladder.

The Viennese group has always been famous for their excellent vaginal surgery; thus, it is not surprising that the author makes vaginal hysterectomy his operation of choice in cases of uterus myomatosus. If the size of the tumors makes the delivery of the fundus per vaginum impossible, he prefers the supracervical method with cauterization of the cervix to a total abdominal hysterectomy. Halban believes that a malignancy in the remaining cervical stump is very rare. This thought is contrary to the concept of American gynecologists who show an increasing trend toward routine total abdominal hysterectomy.

The chapter on carcinoma colli uteri is by far the most fascinating one of the entire book. Crossen and Crossen classify the two surgical methods of treating this disease, namely, the radical abdominal panhysterectomy (Wertheim), and the radical vaginal hysterectomy (Schuchhardt) as "operations of historical importance," and it was not until recently that Meigs revived interest in these procedures. The student interested in these procedures will find the pages dealing with radical surgery in cervical cancer most enlightening. It is regrettable, however, that the internationally accepted classification into the four stages has not been adopted in this work; it would have made the reading of this chapter much easier. For the same reason, the statistics are difficult to evaluate. Unfortunately, the author still adheres to the obsolete terms "operable" and "inoperable."

Although procedures usually are given by name, no references are included in the majority of cases. The print of the book is clear and easy to read, yet the quality of the paper as well as that of the cloth binding leave much to be desired. The illustrations are clear and of prewar quality.

The new edition of this book represents one of the first steps on the road of cultural renaissance of a nation which has been severely devastated by the recent war.

Foot and Ankle. By Philip Lewin, Philadelphia, Lea and Febiger, Ed. 3, 1947, 806 pp. This book completely covers everything pertaining to the foot and ankle. The chapters follow in natural sequence and discuss the principles of etiology, pathology, diagnosis and treatment. Acquired and congenital deformities are discussed and traumatic lesions, including fractures and dislocations, as well as industrial conditions are completely treated.

The volume is extremely practical and is not only recommended as a guide to students, but also to any practitioner who examines or treats foot or ankle conditions. This is a wide scope but it is adequately covered by this book. Considerable energy and thought has been expended on, and incorporated in, this revised text. Experiences from the recent war are a very valuable contribution. The author has presented what would seem to be the last word on foot and ankle conditions and is to be commended for placing a book of this caliber at our disposal.

Abstracts from Current Literature

Atypical Adynamic Ileus Apparently Caused by Nutritional (Thiamine Chloride) Deficiency, D. J. Leithauser, Surg. Gynec. & Obst. 86:543, May 1948. Although recognition of digestive symptoms as a phase of vitamin B deficiency has been well established clinically and roentgenologically, the exact clinical syndrome described by the author has not been previously reported, judging by a search of the literature. In previous reports of digestive symptoms of vitamin B deficiency no emphasis was placed on the fact that severe and uncontrollable abdominal distention might lead to erroneous surgical diagnoses and needless operations. Reports are cited to show that the digestive symptoms accompanying vitamin B deficiencies are not constant and may manifest themselves in various syndromes, depending upon lack of particular food factors, duration of the deficiency, individual metabolic differences in ability to utilize them which in turn are influenced by various acute and chronic diseases. In the author's series the characteristic pathologic changes encountered were edema and thickening of the intestinal walls with engorgement of the blood vessels. In fatal cases in which roentgenologic changes had previously been demonstrated in the intestine, atrophy of the tunica muscularis and mucosa, edema, round cell infiltration and fibrosis of the submucosa and ulceration have been described. The type of pathologic changes and the variety of gastrointestinal symptoms suggest that it would be wise to suspect a nutritional disturbance in any case in which the digestive symptoms, clinical and radiologic findings seem atypical or anomalous. In this way the etiology of certain obscure gastrointestinal conditions might be elucidated, and it may be justifiable to raise the question whether nutritional deficiency may play a role in the causation of at least some cases of so-called nonspecific regional enteritis. In the absence of so-called characteristic lesions the response to therapy must be accepted as significant evidence that a nutritional disturbance is the cause of particular symptoms. Of the author's cases whose symptoms of adynamic ileus were dramatically relieved by administration of thiamine chloride and vitamin B complex only one had the characteristic stomatitis of vitamin B deficiency, and in two, stool examinations failed to reveal evidence of steatorrhea which is characteristic of advanced vitamin B deficiency known as the sprue syndrome. Possibly the syndrome described is more likely to occur in patients who have some liver damage (4 of the 6 cases were chronic alcoholics). The author's experience suggests that nutritional deficiency should be suspected, and a therapeutic trial of vitamins made, in cases of abdominal distention in which the evidence does not justify a positive diagnosis of mechanical obstruction of the intestines. It is also suggested that all surgical patients receive vitamin B complex parenterally before operation and for three days thereafter.

Cartilaginous-Cup Arthroplasty in Ununited Fractures of the Neck of the Femur, J. R. Moore, J. Bone and Joint Surg. (Am. Vol.) **30A**:313, April 1948. Cartilaginous-cup arthroplasty, devised by the author in 1938, properly should be regarded as a modification of the Brackett operation. It consists in removing the femoral head and reaming out the osseous portion until a cartilaginous cup with a very thin layer of bone (1/8 inch or less) remains. The cup then transmits light. The end of the femur is carefully rounded off with a cup reamer and the cartilaginous cup fitted to it. Femur with cartilaginous cup is returned to the acetabulum and the greater trochanter is reattached to the lateral aspect of the shaft 2 or 3 inches below the cup level. After careful closure of the wound in layers a double hip spica from ankle to nipple line is applied with the operated leg in maximum abduction (60 to 80 degrees) with the patella pointing straight up. Sometimes, in order to obtain the desired abduction (minimum of 60 degrees) an adductor tenotomy is required. Complete hemostasis, clamping and tying all vessels is essential. The cup must be fitted snugly and placed accurately on the end of the femur neither in valgus nor in varus and with neither anterior nor posterior tilting. Its position is maintained by wide abduction accomplished by abducting the femur until firm resistance is met.

Aseptic Gastric Resection, Billroth I Technic, A. Monteiro and H. Barreto (Brazil), Surgery **23**:178, Feb. 1948. The thorough hemostasis achieved may account for the success of the Monteiro technic. Since the vessels of the stomach lie in the submucous layer, a perfect crushing will tear this layer together with the mucosa and circular fibers of the muscularis. When crushing does not accomplish hemostasis the vessels which are withdrawn with the submucosa will continue to bleed into the cavity The von Petz instrument performs the crushing but not a lamination that would pierce and permit the submucosa to retract. When the clips

[illegible]

[illegible] Ulcer of the Small Intes[illegible] [illegible] and H. B. [illegible] 1948. The [illegible] ulcers of the [illegible] which they [illegible] symptoms before [illegible] is the most [illegible] per cent). The mor[illegible] diagnosis is obscure [illegible] lesions should be [illegible] present a problem of [illegible] with no roentgeno[illegible] of esophagus, [illegible] patients having [illegible] suggestive of [illegible] no such perfora[illegible]; and patients with [illegible] suggestive of peptic [illegible] evidence of such.

[illegible] in the Surgery of Arteriovenous Fistulas, with [illegible] Dicumarol, H. B. Shu[illegible] and H. H. Lampert, [illegible] 1947. In institutions in [illegible] able to provide facili[illegible] determinations for blood [illegible] of the authors suggests [illegible] over heparin in [illegible] stration. If these are [illegible] should not be used, for its [illegible] is fraught with great [illegible] circumstances heparin can [illegible]. It is also suggested [illegible] to obtain adequate pro[illegible] ratively, using dicumarol, [illegible] anticoagulant therapy with [illegible] of the surgical procedure. [illegible] reparative procedures upon [illegible] be safely undertaken when [illegible] effect has been [illegible] or both. Though [illegible] anticoagulants has been fur[illegible] has been obtained for [illegible] therapy renders less likely [illegible] segment of artery.

[illegible] in the Absence of [illegible], [illegible]nold S. Jackson, Ann. [illegible] The difficulty con[illegible] early detection of [illegible] emphasized. Three cases [illegible] the point. All three had [illegible] by several physicians but it was [illegible] any clinical signs of pathologic [illegible] the breasts. All three came for examination because of the presence of a lump in the axilla. In the first patient histologic examination revealed carcinoma in the lymph node excised, and the patient was treated with radium packs to the axilla. Three years and four months after removal of the axillary node the primary growth became manifest in the breast. The next two patients were subjected to mastectomy on pathologic evidence of malignancy in the lymph node. Examination of the [illegible] breasts revealed, in one, several [illegible] suggestive of carcinoma and sev[illegible], and in the other several sus[illegible] the size of a match head which [illegible] but hardly distinguished from [illegible] and one node that ap[illegible] revealed carcinoma.

[illegible] Postoperative Swelling of the [illegible] Mastectomy, Henry A. Hanelin, [illegible] M. Wolffson, and E. D. [illegible] 55 723, Dec. 1947. Patients [illegible] swelling of the [illegible] into the stellate [illegible] per cent solution [illegible]

Original Articles

Surgical Consideration of the Nonmalignant Achlorhydric Stomach*

LYON H. APPLEBY, M.D., F.R.C.S. (ENG.), F.R.C.S. (CANADA), F.A.C.S., F.I.C.S.
VANCOUVER, B. C.

FOR a great many years it has been a sine qua non that if there is no free hydrochloric acid in the gastric secretions, there neither is nor can be an ulcer. The literature of the world has been replete with such assertions, but recently this catechism is being called into question more and more, and a literature which cannot be ignored is building up around the achlorhydric ulcer, both gastric and duodenal.

I do not challenge the fact that at the time of its creation a peptic ulcer develops as a result of digestive action of pepsin acting upon injured gastric musoca in the presence of free hydrochloric acid; nor do I question the fact that pepsin is active only in the presence of free hydrochloric acid in adequate pH concentration. But peptic ulcer once established may last a great many years, and while the vast majority of them do heal when the gastric secretions lose their hydrochloric acid values, to accept the dogma, "No acid—no ulcer," would be to proclaim that all peptic ulcers, in the presence of any concomitant disease which normally or usually develops a coincidental achlorhydria, must forthwith and without reservation result in the healing of that ulcer. To accept this teaching would be at direct variance with my own experience and the published statements of many others. There are of course a great many people in whom the lack of free hydrochloric acid in the gastric secretions does not produce symptoms of disease. Carey and Ylvisaker[1] report 17.4 per cent normal males and 22.3 per cent normal females with no free hydrochloric acid after histamine and also report that in men over seventy years of age, 38.6 per cent, and among females over seventy, 77 per cent, are devoid of free hydrochloric acid after histamine. The objection to their investigation is that their tests were conducted only over a period of 60 minutes, whereas it is now well known that the hormonal phase of acid secretion may be delayed two or three hours after food ingestion. Bloomfield and Polland[2] show that 12.2 per cent of the normal population is without free hydrochloric acid following histamine. Ruffin and Dick,[3] in a large series, reported to be negative by gastrointestinal x-ray, showed that 11 per cent had no free hydrochloric acid after a single withdrawal at 45 minutes. As decade succeeds decade in the life of the human stomach, the incidence of achlorhydria increases. The great fillip given to the study of gastric secretions by the gastric disturbances following vagotomy has resulted in a recurrent wave of papers expressing dissatisfaction with current methods of examining gastric secretions in our clinical laboratories, the two-hour test meal with histamine stimulation, the 24-hour collective methods of estimation, the volumetric measurements with phenol red or phenolphthalein recommended by Immerman[4] and recently reaffirmed by Griswold[5] are all expressions of dissatisfaction with one or other phase of such examinations. The test meal itself is the weak point of such investigations, with its diluent propensities, its neutralization by duodenal regurgitation, its swallowed saliva. It needs some universal standardization. Reference to acid values obtained in one clinic are of little value in referring to those obtained in another. In recent years many physicians have abandoned the procedure as being of little diagnostic value, believing that its great field of usefulness was as a gauge through which [illegible] estimate procedure. Some standard stimulus powerful enough to bring out differences of secretory capability without the undesirable desiderata of test meals is required.

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* Read before the Sixth International Assembly, International College of Surgeons, Rome, May 16-24, 1948.

The literature is becoming quite redundant with references to peptic ulcer in the presence of achlorhydria. Ruffin and Dick[3] report 24 cases proved roentgenologically. Weatherby and MacNider[6] report both gastric and duodenal ulcer in the presence of achlorhydria, proved by surgical excision and in the absence of more serious intercurrent disease. Wood,[7] reporting a series of 94 diabetics, found 21 out of 58 to have no fasting free hydrochloric acid and 5 of these throughout the examination were proved to have achlorhydric ulcers. Palmer and Nutter,[8] in the investigation of over 1,000 cases of duodenal and gastric ulcer, failed to find any case with complete achlorhydria. I would be much more impressed if they had said that in a thousand cases of achlorhydria they had failed to find any evidence of ulcer.

One of the purposes of this presentation is to report 32 cases comprising 23 gastric and 9 duodenal peptic ulcers in the presence of achlorhydria. Another purpose is to add my small spark to the mounting flame of opinion that while free hydrochloric acid may indeed be a prerequisite in the genesis of peptic ulcer, once the ulcer is soundly established nd indurated, free hydrochloric acid is not he sole, nor possibly the main, cause of its persistence. In presenting this series I have endeavored to avoid the various pitfalls as I have seen them. Most of these cases have been observed over a period of years. Fractional gastric analyses have been carried out on from one to nine occasions preoperatively from 1½ to 24 hours duration, with and without histamine stimulation, and with and without provocative hyperinsulinism response. Complete gastrointestinal roentgenologic studies have been made in all cases and frequently repeated at intervals in most. All cases have been operated upon, surgically excised, serially sectioned, proved to be nonmalignant, both by microscopic investigation and the acid test of elapsed time without recurrence. These ulcers are unhealed peptic ulcers—nonmalignant, nondiabetic, nonleukemic, nonsyphilitic and not sprue.

TABLE 1

Age at Operation	No. of Cases	
	Gastric Ulcer	Duodenal Ulcer
20–30	1	3
30–40	7	4
40–50	7	1
50–60	5	..
60–70	2	1
Over 70	0	0

I present here the history of a typical gastric ulcer patient.

Case 1. M. H., female, x-ray technician, age 49. There was a history of gastric distress for 4½ years—diagnosed in 1943 as perforating ulcer of lesser curvature and demonstrated high up radiographically. At that time there was achlorhydria and a hypochromic low-grade anemia. Her main complaint was physical weakness, some diarrhea and vague digestive disturbances—minimal pain with intervals of comparative well being—but always feeling well below par. She had been under medical management until February, 1947, when I examined her for the first time. She was pale and weighed 134 pounds. Red cell count, 3,820,000, Hg, 74 per cent, color index 0.98, cell vol. 38 per cent. Plasma protein, 5.44 per cent. F.G.A.—no free hydrochloric acid, total acidity 80 dropping to 50 in 90 mins. No change on administration of 0.5 mg. histamine from the 90-min. to 180-min. readings at 15-min. intervals. Administration of 125 units plain insulin. Blood sugar 29 mg. per cent. Free HCl 0 30 min. Blood sugar 33 mg. per cent. Free HCl 0. Kahn neg. Urine neg. X-ray revealed penetrating ulcer high up on lesser curvature near esophageal opening. Chest was clear. Operation, Mar. 10, 1947: Resection of lesser curvature leaving long tubular stomach; gastroenterostomy. Feb. 1948: Excellent health. Red blood cells, 4,600,000, Hg. 89 per cent. F.G.A.—total acid 44, free HCl 0, after 0.5 mg. histamine free HCl 0. Weight 149 lbs.

I present here the history of a typical duodenal ulcer case.

Case 2. G. M. T., male, age 27 (1934). The patient gave a history of intermittent attacks of vomiting, diarrhea, vague pain and discomfort after food intake since the age of 19. Diagnosed pylorospasm radiologically in 1925. In 1925 a single gastric analysis showed achlorhydria. From 1926 to 1934 10 additional gastrointestinal fractional gastric analysis studies were made and all

TABLE 2. PERSISTENT PEPTIC ULCERS IN PRESENCE OF ACHLORHYDRIA

Cases	Ulcer Type	Age	No. Preop. F.G.A.*	Date of Operation	Free HCl	After Histamine	Sex
1	Duodenal	50	2	1930	0	—	M
2	Gastric	47	2	1927	0	—	M
3	Duodenal	60	4	1931	0	—	M
4	Gastric	27	3	1931	0	—	F
5	Duodenal	27	11	1934	0	0	M
6	Gastric	30	4	1937	0	0	F
7	Gastric	31	5	1942	0	0	F
8	Gastric	40	3	1940	0	0	M
9	Gastric	44	7	1941	0	0	F
10	Gastric	42	4	1940	0	0	F
11	Duodenal	40	5	1946	0	0	M
12	Gastric	42	4	1940	0	0	M
13	Duodenal	22	2	1927	0	—	M
14	Duodenal	26	3	1930	0	—	M
15	Gastric	60	3	1947	0	0	F
16	Gastric	48	3	1946	0	0	F
17	Duodenal	31	5	1942	0	0	F
18	Duodenal	34	4	1944	0	0	M
19	Gastric	69	7	1938	0	0	M
20	Duodenal	37	4	1938	0	0	M
21	Gastric	30	2	1944	0	0	F
22	Gastric	51	4	1933	0	—	F
23	Gastric	52	3	1936	0	0	F
24	Gastric	59	7	1943	0	0	M
25	Gastric	47	2	1940	0	0	F
26	Gastric	43	4	1939	0	—	F
27	Gastric	55	5	1940	0	0	F
28	Gastric	36	4	1942	0	0	M
29	Gastric	31	2	1930	0	—	M
30	Gastric	30	3	1933	0	—	F
31	Gastric	49	4	1946	0	0	F
32	Gastric	59	2	1948	0	0	F

* Fractional gastric analysis

showed achlorhydria. The patient was treated for this as an entity with replacement acid therapy and diet. In 1934 the patient suffered a severe gastroduodenal hemorrhage and four months later an x-ray diagnosis of duodenal obstruction with penetrating ulcer was made. At operation a penetrating duodenal ulcer with indurated fibrotic area surrounding it was disclosed. The first part of duodenum, with the ulcer, and 60 per cent of the stomach were resected. Recovery and subsequent history were uneventful. Followup in 1948 showed the patient, now aged 41, to be in excellent health. F.G.A. shows free HCl 21 after 0.5 mg. histamine at end of first hour withdrawal—the first time in a long carefully observed life that his gastric secretions have been shown to have free HCl.

What are the outstanding features of these peptic ulcers which causes them to be so frequently missed as they undoubtedly are? I believe it to be due to the atypical nature of their symptomatology. There is no doubt in my mind that the acuteness of the symptoms which we have come to regard as typical of ulcer is due in large part to its resultant hyperacidity. While peptic ulcer is not caused by, nor caused to persist by acid alone, yet the presence of acid definitely has much to do with the intensity of the associated pain which I believe to be of muscular origin. I believe that this has recently received further proof from Holt [9] who showed that

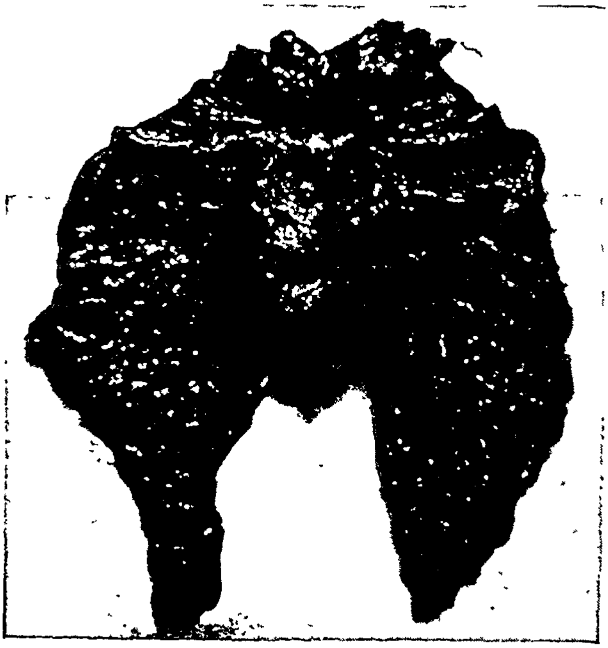

Fig. 1. Twin ulcers persisting after achlorhydria of 14 years duration. Resection specimen.

after tetraethylammonium the pain ceased with the relaxation of the stomach, long before the highly acid gastric contents have been passed through the pylorus. I do not believe that there ever is a great deal of unrelievable pain associated with ulcer in the absence of "a point of fixation" and overaction thereupon of the gastric musculature. As a matter of fact, it is my observation that the longer an ulcer has persisted, the less painful it is liable to become, unless of course by advancing perforation it is progressing into areas of fresh tissue in close juxtaposition to its base. It is the young fresh ulcer in the earlier part of life, and which is accompanied by hyperchlorhydria, that causes most pain. I believe that it is the absence of many of these severe symptoms of pain incident to the acidity which causes so many of these cases to go unrecognized. The high incidence of concomitant conditions associated with these cases has been another outstanding feature. The most consistent have been hypochromic types of secondary anemia and in some instances fairly high degrees of hypoproteinemia in the gastric ulcer series and the comparative good health of the achlorhydric duodenal series. The vast majority of these patients were for a considerable time in the hands of physicians who recognized the achlorhydric state, the associated anemia and hypoproteinemia, had learnedly dissociated it from the pernicious anemia group of primary anemias but who had treated the achlorhydric state as an entity and frequently missed or minimized the importance of the otherwise symptomless chronic gastric ulcer. These cases were all treated by replacement therapy for some time prior to their being resected, and with fair success from the standpoint of their anemic and hypoproteinemic standards. Nevertheless, the effect of the acid replacement, either by dilute hydrochloric acid or glutamic acid phosphate capsules, left much to be desired. I agree wholeheartedly with the observations of Koehler and Windsor[10] as to the ineffectiveness of acid replacement therapy in anything like dosages which these people are able to tolerate. Later in this discussion I shall demonstrate its ineffectiveness.

Pathologically, the dominant feature has been the apparently desperate attempts at healing processes to be observed microscopically and grossly, as evidenced by the great redundancy of fibrous tissue in and around the base of the ulcer. One is reminded of the indolent ulcers of the leg which remain unhealed by the very exuberance of their own fibrous tissue induration. These cases usually are so chronic that their vascular supply is quite inadequate to permit epithelialization. In the vast majority of cases the remainder of the stomach was normal except for pathologic evidence in a few instances of that vague and much abused condition, atrophic gastritis. I have been struck by the absence of enlarged lymph nodes around these cases; those that are to be found usually are hard and shotty as though they had long ago given up the struggle. Two cases showed twin ulcers.

Perhaps our greatest difficulty with these cases has been the determination of which are, and which are not malignant. These 32 cases have been culled from about 1,000 proved cases of gastric or duodenal ulceration which have passed through my hands during the past 24 years. In most of these cases, particularly the duodenal ones, it was realized that the ulcer itself probably was benign. Among the gastric ulcer series, the fact of their years of chronicity under observation, and the more or less desultory treatment they received, convinced me in advance of their probable benignity. In those cases with a less prolonged history, and less accurate record of close observation, the diagnosis of ulcerative malignancy is the logical and certainly the safest one. In my own experience the degeneration of a frankly peptic ulcer with high acid values into a carcinomatous ulcer with or without materially lowered acid values is indeed a rather rare phenomenon. While I have not worked out this relationship accurately on a mathematical basis, it is my belief that such a degenerative change occurs in much less than the usually quoted figure of around 10 per cent. My own cases have been either frankly ulcer or frankly carcinoma from the outset and, if benign, usually have remained benign. I know of no test which at operation or before positively decides which ulcers are and which are not malignant. Rapid section may often fail to cut through a carcinomatous area, cytologic smears are much too unreliable. Speaking generally the achlorhydric ulcer commonly is malignant but these 23 cases prove that not all of them are. The problem of cure of gastric ulcer has not been too difficult. In my experience at least the difficulty has been in establishing its exact identity.

Biopsy resection, wedge resection, sleeve resection, with or without gastroenterostomy, is the operation of choice. It seems such an unnecessarily severe operation to remove five-sixths of the stomach for a benign ulcer from one whose acid producing mechanism has already failed. Two of the major difficulties about these ulcers are that practitioners are prone to treat achlorhydria as an entity and to assume, in the absence of demonstrable malignancy and in the presence of symptoms highly atypical of ulcer, that all that is necessary is a bottle of hydrochloric acid. The other difficulty is at operation, convincing myself that this ulcer may safely be treated by local excision and that a radical gastrectomy is not indicated. I might reëmphasize the well-known fact that gastric ulcer is a comparatively uncommon disease. Vanzant and Alvarez[11] point out that in their series for every man with gastric ulcer there are five with gastric carcinoma and 20 with duodenal ulcer.

From the standpoint of age, most of these cases were between the ages of 35 and 50. For the purposes of this paper 13 have recently been thoroughly reexamined from 18 years to 7 months after operation. Nine remain achlorhydric, four have a minor restitution of acid values and one of these up to 21 as a high reading after histamine. This particular case had had 9 previous fractional gastric analyses prior to operation without evidence of acid; only once had histamine been used. Now, 14 years after his resection, he has some free hydrochloric acid following histamine for the first time in his

TABLE 3. POSTOPERATIVE SERIES: 1947–1948 REEXAMINATION

Type of Ulcer	Year of Operation	No. of Preop. F.G.A.'s °	Present Age	F.G.A.° Now	Present Blood Protein	Present Hg.
Gastric	1940	4	50	0	6.2	88
Gastric	1940	3	47	0	5.2	78
Duodenal	1934	11	41	21	5.76	87
Duodenal	1931	4	77	0	5.4	80
Gastric	1944	2	33	8	7.0	94
Duodenal	1946	5	43	4	5.0	78
Gastric	1937	2	57	0	5.2	91
Gastric	1943	7	64	4	6.1	92
Gastric	1930	2	70	0	7.0	89
Gastric	1942	5	38	0	4.9	68
Gastric	1937	4	38	0	5.7	77
Gastric	1947	3	61	0	6.0	89
Gastric	1946	3	50	0	5.7	97

° Fractional gastric analysis

life, or at least during the 21 years he has been under continuous observation. All, including this case, remain acid-free without histamine.

It is not the purpose of this paper to present the problem of the postvagotomy stomach, but some very disturbing situations have arisen here That all ulcers in the vagotomized stomach and duodenum, even in the presence of proved achlorhydria, do not heal is abundantly evident and now well known. But even more disturbing things are becoming increasingly evident. Janes,[12] in a personal conversation, described two cases of duodenal ulcer treated by vagotomy in which gastric ulcers developed subsequently in situations where ulcers had not previously existed. This has occurred in at least one other case within my consultation experience. Instances such as this cast increasing doubt even upon the genesis of ulcer as an exclusive acid-pepsin combination. Evidence that in certain instances intense progressive activity continues in these achlorhydric ulcers is clearly indicated in one case in which numerous hemorrhages had occurred over several years, all minor but all from a known ulcer in an achlorhydric stomach which was subsequently resected, after which no further hemorrhages occurred through 11 years of continuing achlorhydria. The case shown in Figure 2 (Case 3) is particularly interesting. Briefly, continuing gastric pain and ill health over a period of seven months, with determinations of achlorhydria twice repeated went on to the development of gastrocolic fistula. Of course, this was considered to be malignant and, as a measure of palliation, was excised by sleeve resection of the stomach and resection of the transverse colon. Exhaustive pathologic investigation showed this to be nonmalignant. In fact, microscopically it proved to be a typical benign peptic ulcer as the photomicrograph reveals. There is no evidence of malignancy, leukemia, syphilis or anything else which would explain its activity. Why then does this ulcer continue to progress to the extent of fistulous communication with the colon, the gastric contents being anacid during the period of its progression?

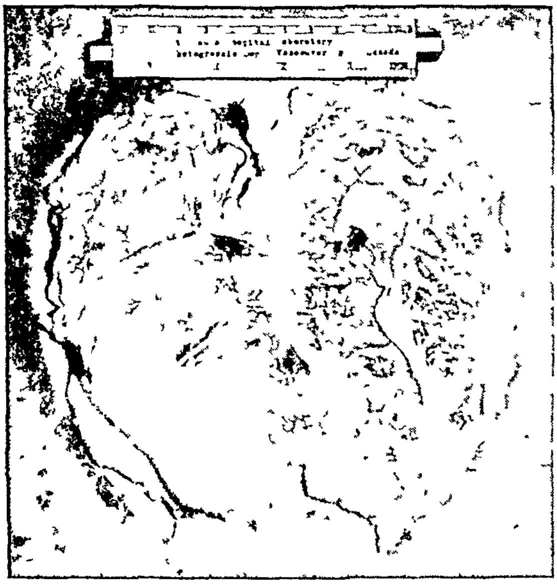
Fig. 2. Gastric view of gastrocolic fistula, nonmalignant ulcer of achlorhydric stomach, indicating continuing digestive activity of the ulcer.

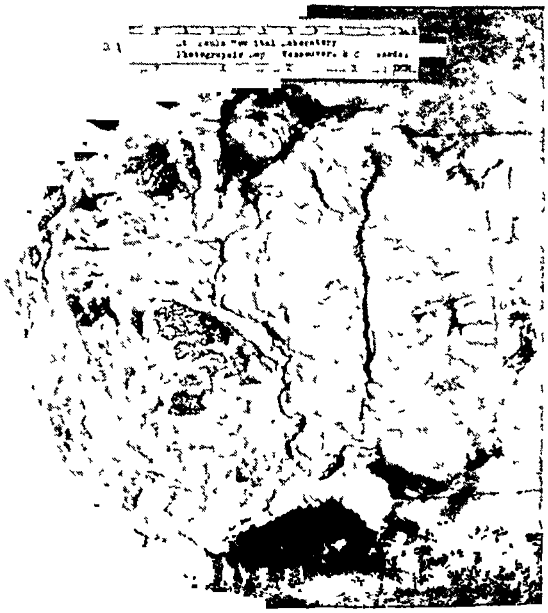
Fig. 3. Colonic view of Figure 2.

The gastric fish bone perforation (Case 4) had been under my care for a month and had been on replacement acid therapy during that time with no result whatever. The fish bone was not in the least decalcified in spite of replacement therapy for the period of a mouth. The patient with perforation of Meckel's diverticulum had been unaware of her anacidity.

Achlorhydria presents a challenge to our diagnostic acumen and is not always given the attention it deserves. The casual acceptance of achlorhydria as a clinical entity worthy of nothing more than inadequate replacement therapy is an adequate acceptance of responsibility. The fish bone series cited above indicates the too little publicized dangers inherent in simple unrecognized anacid states and surely suggests the need for more careful dietetic screening of known cases of anacidity. The old and dangerous practice of placing a diagnostic name upon the lapel of a doubtful case all too frequently results in a slackening of the pace of investigative interest with respect to the elucidation of its true nature, and this I think holds true in achlorhydria. The "No acid—no ulcer" dogma has frequently suspended investigation on the finding of anacidity; definitely this should not be.

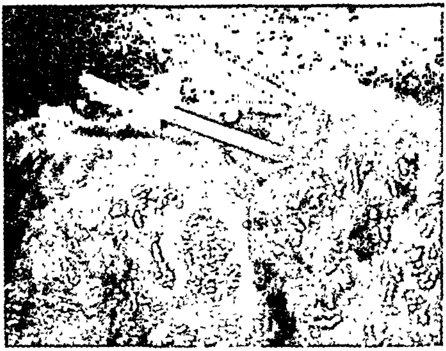

Fig. 4. Fish bone perforating lesser curvature of achlorhydric stomach with history of seven months duration. No dissolution after 5 weeks of acid repletion therapy. Resection.

Case 3 K. M., married female, age 68. The patient was extremely emaciated, appearing very much older than her years. She gave a history of gastric distress and pain for seven months. Vomiting was an important sign. Weight loss was extreme. In March, 1948, x-rays made by another physician revealed a gastrocolic fistula through the greater curvature. Barium entered from the stomach into the colon, subsequently into the stomach from a barium enema. F.G.A.—total acid 56, free HCl, 0; after 0.5 mg. histamine, free HCl 0. Discontinued after three hours. Red blood cells 4,160,000; Hg. 85 per cent, color index 1.01. Wh[illegible] [illegible]50, polymorphonuclears 65 per cent. Cell volume 50 per cent. Plasma protein 6.83 per cent. NPN 46 mg./per cent. Blood chlorides 474 mg./per cent NaCl. X-ray of chest revealed limited pleurisy right costophrenic angle. *Preoperative diagnosis*: Malignant gastrocolic fistulous communication. Operation March, 1948, was undertaken as a palliative measure.

At operation there was no evidence of metastases. A local mass of induration surrounding the fistulous communication was present with enlarged glands in close juxtaposition. Sleeve resection of stomach with anastomosis by Billroth I to aspect of lesser curvature was carried out. Midtransverse colectomy with omentum and transverse mesocolon. Pathologic findings: Multiple serial sections of many parts and surrounding glands show this ulcer to be benign. There is no evidence of malignancy.

There are, however, other interesting phases of anacidity which may develop surgical complications as the following two cases attest.

Case 4. M. M., female, age 50. There was a history of constant gastric pain which was unrelated to food and unrelieved by food alkalies or medication since October, 1947. Preliminary investigation was negative. In April, 1948, she was seen by me, still complaining of pain. There had been slight weight loss. Achlorhydria for free HCl. Total acid 39. Red blood cells, 4,700,000, Hg. 88 per cent.

Cell vol. 42. Plasma proteins 6.7 per cent. X-ray of the prepyloric area showed indefinite findings thought to be antral gastritis. The question of malignancy was considered. For three weeks the patient took hydrochloric acid 30 gtts. with meals but the symptoms were unrelieved. Surgical exploration in May, 1948, revealed prepyloric thickening of undetermined nature. This was thought to be perhaps early mural sarcoma, but the constant pain could not be thus explained. Segmental biopsy, sleeve resection, end-to-end anastomosis was done. Pathologic report (in operating room): Intramural gastric abscess containing fish bones projecting into lesser omental attachment.

Case 5. B. G., married female, age 43. There was a two weeks' history of abdominal pain, which became fairly acute the last three days. Temperature 97° F. White blood cells, 8,800, polymorphonuclears, 57, lymphocytes 35. Diagnosis, subacute appendicitis. Laparotomy the following day revealed a fish bone perforation of Meckel's diverticulum. Ten days postoperative: Total acidity 35, free HCl 0 after histamine 11. Recovery uneventful.

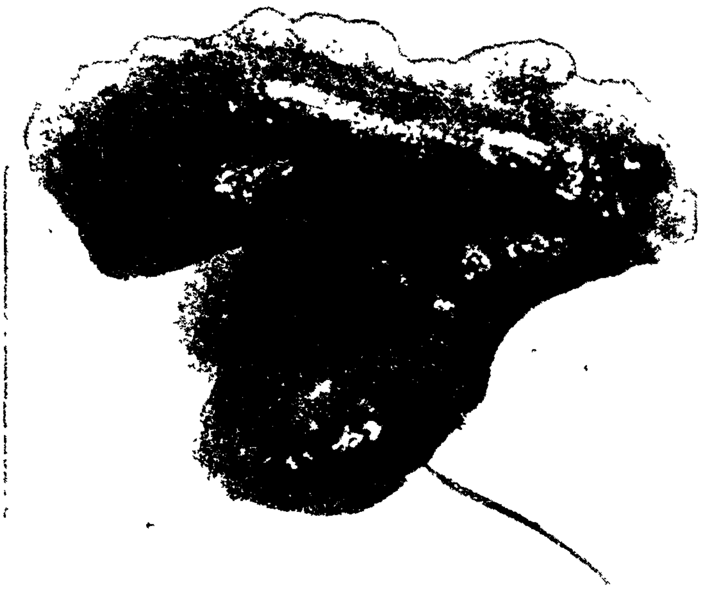

Fig. 5. Fish bone perforating Meckel's diverticulum and simulating acute appendicitis. Had passed through an achlorhydric stomach undissolved.

SUMMARY

Some better method of estimating gastric secretion is needed than is available by present fractional and volumetric methods of analysis.

The "No acid—no ulcer" dogma is challenged with respect to the persistence of ulcer and the persistence of its activity, the opinion of Berg,[13] Ivy,[14] Nissen,[15] Best,[16] Ogilvie,[17] etc., to the contrary notwithstanding.

Thirty-two cases of peptic ulcer continuing unhealed in the presence of anacidity are presented and discussed.

The atypical symptomatology of achlorhydric ulcers is confirmed together with the ineffectiveness of acid replacement therapy. The acceptance of the diagnostic challenge of achlorhydria is strongly urged.

Local resection rather than gastric resection is the operation of choice.

There has been no operative mortality in these cases.

Two interesting fish bone cases are presented.

SOMMAIRE

Il nous faut de meilleures méthodes pour évaluer la sécrétion gastrique. Celles que nous possèdons actuellement avec nos méthodes

d'analyse fractionnelle et volumetrique sont inadéquates. Malgré l'opinion de Berg, Ivy, Nissen, Best et Ogilvie, nous contestons le dogme de "pas d'acide, pas d'ulcère," vu la persistance de l'ulcère et de ses activités. Trente deux cas d'ulcères peptiques non guéris par la présence de l'anacidité sont présentés analyses et discutés. La symptômatologie atypique de l'ulcère achlorydrique est confirmée ainsi que l'inefficacité de la thérapie basée sur l'emploi d'antacide. La résection *locale* plutôt que la résection gastrique est l'opération de choix. Il n'y eut aucune mortalité opératoire dans nos cas. Deux cas dûs à des arêtes de poisson sont présentés. L'absence d'hyperchloridrie n'exclut pas la présence de l'ulcère gastrique.

SUMARIO

Se deben de descubrir mejores metodos de estimacion de la secrecion gastrica que los de uso actual. Es cuestionable el dogma "sin acides no hay ulcera" en casos de ulcera activa persistente [illegible]ante las opiniones de [illegible] como Berg, Ivy, Nissen, Best y Ogilvie. Se han discutido 32 casos de ulceras pepticas con hipocloridia de duracion cronica y refractorias al tratamiento antacido. En estos casos la reseccion local de la ulcera es preferible que el mas radical de reseccion gastrica sub-total. Con esta tecnica no ha habido mortalidad operatoria tambien se han presentado dos casos interesantes de *espina de pescado.*

RIASSUNTO

L'A. ritiene che gli attuali metodi di analisi del succo gastrico non siano soddisfacenti. Quest' opinione si basa sopra l'osservazione di 32 casi di ulceri peptiche persistenti a lungo nonostante un'anacloridria. Il dogma "mancanza di acido, assenza di ulcera" sostenuto da Berg, Ivy, Nissen, Best e Ogilvie, non e' quindi esatto. L'A. discute i sintomi e la terapia delle ulceri anacloridriche. Si dichiara a favore della resezione locale, piuttosto che della resezione gastrica.

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Cancer of the Rectum: Its Surgical Management without Colostomy and with Preservation of the Internal and External Sphincter[*]

HARRY E. BACON, M.D., F.A.C.S., F.I.C.S.,[†] AND
G. P. GIAMBALVO, M.D., F.A.C.S., F.I.C.S.[‡]
PHILADELPHIA, PENNSYLVANIA

IT is well recognized that the treatment of cancer of the rectum and sigmoid colon rests alone in radical surgical extirpation. In the ensuing discussion, it is the purpose of the authors to draw upon their personal resources of 640 patients with malignancy to the period ending September 1, 1947. The distribution is disclosed in Table 1.

TABLE 1. DISTRIBUTION.

Site	No.	Per Cent
Sigmoid	82	12.8
Rectosigmoid	191	29.8
Rectum	351	54.9
Anus	16	2.5
Total	640	100.0

Of the total number of cases, only those of the rectum proper were evaluated as to the site involved. Of the 351, 178, or better than 50 per cent, were circumferential. The balance were localized as shown below.

Posterior wall with or without lateral quadrant	88
Anterior wall with or without lateral quadrant	76
Lateral wall alone	9
	173

INCIDENCE

Of the 640 cases, 618 were white and 22 or 3.5 per cent were colored. As to sex, 352 were males, and 288 females. The age incidence is tabulated in Table 2.

The histologic type of tumor is shown in Table 3.

In our series of 640 cases, excluding the 6 cases of sarcoma and 2 of malignant melanoma but including 14 cases of epithelioma, the tumor was graded according to Broder's classification in 592 instances. The distribution is tabulated in Table 4.

TABLE 2. AGE INCIDENCE.

Years	No.
17	1
21–30	14
31–40	56
41–50	128
51–60	234
61–70	126
71–80	77
81–85	4
Youngest........ 17	Oldest........ 85

TABLE 3. TYPE OF TUMOR.

Tumor Type	No. Cases	
Adenocarcinoma	618	(96.5%)
Epithelioma: Squamous .... 12 Basal 2	14	
Malignant melanoma	2	
Fibrosarcoma	3	
Leiomyosarcoma	2	
Neurogenic sarcoma	1	
	640	

TABLE 4. GRADING OF TUMORS.

Grade	No. Cases	Percentage
I	74	12.5
II	311	52.5
III	156	26.4
IV	51	8.6
Not graded	48	....

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[*] Read before the Sixth International Assembly, International College of Surgeons, Rome, Italy, May 16–24, 1948.

[†] Professor and Head of Department of Proctology, Temple University Medical School, Philadelphia, Pa.

[‡] Associate Professor of Surgery, Temple University Medical School, Philadelphia, Pa.

The incidence of nodal metastasis in relation to circumferential involvement is shown in Table 5.

TABLE 5. NODAL METASTASES.

Percentage of Circumference	No. Cases	With Metastases	
		Cases	Per Cent
¼	14	4	28.5
½	25	11	44.4
¾	16	8	50.0
Entire	25	16	64.0

Comparing various segments of the rectum proper, Seefeld and Bargen [1] found incidence of nodal involvement to be 48.8 per cent in the upper, 50 per cent in the middle and 40.2 per cent in the lower third. In our series the correlation was as follows:

Location	With Metastases		
	Cases	Per Cent	
Sigmoid	9	60.0	
Recto-sigmoid	13	63.3	
Rectum	24	44.0	
Anal Canal: Squamous	4	57.1	50.0
Basal	0	0	

Investigation has shown that it is unusual for carcinoma to invade lymph nodes until the tumor has penetrated the rectal wall except where the growth is high grade. The dictum that the more anaplastic the neoplasm, the higher the incidence of lymphatic metastasis, has been substantiated as shown in Table 6.

TABLE 6. INCIDENCE OF METASTASES ACCORDING TO GRADE.

Author	Grade I	%	Grade II	%	Grade III	%	Grade IV	%	Total No. Cases
Seefeld & Bargen [1]	3	21.4	20	37	18	75	6	75	100
Coller & Kay [2]	0	0	19	57.5	13	72.2	1	100	52
Dukes [3]	16	24.2	23.1	41.3	159	71.0	13	92.8	985
Bacon [4]	1	9.1	16	45.7	7	70	3	100	39

SYMPTOMS

Cancer of the lower bowel does not cast its ominous shadow by any pathognomonic or characteristic symptoms. In general, the complaints referable to the rectum are vague and variable depending in part on the duration, size, and location of the tumor and the degenerative changes that have taken place. Growths in the sigmoid and at the rectosigmoid junction tend to encircle the circumference of the bowel and since the lumen is smaller, obstructive symptoms are prone to develop. Bleeding is the most constant and one of the first symptoms. In our group of cases the passage of blood was cited in 547, or 85.6 per cent. By "change in bowel habit" is meant an alteration of, or deviation from, the normal. It is a symptom complex to be highly respected and one that warrants thorough investigation. Patients frequently complain of constipation and recall the increasing need for laxatives. This was cited in 343 of our patients, or 53.7 per cent. As a result of an attempt to promote normal bowel function by catharsis a tendency toward diarrhea ensues which was described in 202 of the patients, or 31.7 per cent. The fact to be emphasized is that the evacuations are different than heretofore. A true diarrhea does not occur. Because of the induced inertia, and the laxative employed, a "frequent desire" or "exasperating attempt" for stool is cited. The "false urge" to empty the bowel with the expulsion of flatus occurring several times daily is significant and was noted by 241 patients or 37.8 per cent. Incompleteness of evacuation—the sensation that the movement is unsatisfactory—was mentioned by 268 or 41.9 per cent. The necessity to arise before the accustomed hour because of a desire for stool—"early morning diarrhea"—was complained of by 108 patients or 16.9 per cent. Ribbon or pencil-shaped stools are not uncommon in anal carcinoma and where the lesion is lying low in the rectum, but are exceedingly infrequent above these areas. Such was described by 31, or 4.8 per cent, of the patients.

Pain is not an early symptom of rectal cancer. Usually it is the result of obstruction or invasion of adjacent organs and structures. Seefeld and Bargen[1] found a 30-per cent incidence of endoneural and perineural invasion, of which pain was complained of in approximately one-third of their cases. While the terms "gnawing" and "boring" may be applied, patients usually identify the pain as an uneasiness or discomfort occurring in the rectum, before, during, after, or independent of defecation. Later a feeling of fulness and weight in the rectum develops which may be constant or intermittent. Still later it may be present as a dull ache, a sharp stabbing pain or burning sensation confined to the rectum or sacral region, or it may radiate down the limbs, shoot through the pelvis or to the lower abdomen. Disturbances referable to the bladder, urethra and prostate are not uncommon and were mentioned by 52, or 8.2 per cent, of the patients.

Anal carcinoma or epithelioma is well known for the pain it produces which is explainable by its innervation, namely, somatic or cerebrospinal. Increased straining and tenesmus are concomitant features. Of the 12 cases of squamous cell carcinoma, pain was a factor in all; in addition, both leiomyosarcomas and one malignant melanoma caused pain.[5]

Abdominal discomfort or distress tends to dominate the clinical picture where the malignant process is located in the sigmoid and at the rectosigmoid junction. Thus, the patient becomes "abdomen conscious" by virtue of the disturbed physiology. Pain localized in the left lower quadrant or radiating across the lower abdomen and "cramp-like" or "colicky" in character, is frequently cited. Distention with rumbling and gurgling (borborygmus) are commonly complained of and not occasionally some relief is experienced with or following evacuation of the bowel. Variants of pain occur in 55 per cent of cases which nearly conforms to the incidence of 61 per cent reported by Rosser.[6]

The discharges associated with malignancy of the lower bowel usually are described as blood and pus. Particles of fecal material, pus from degeneration of the growth, blood from ulceration and mucus as a result of the irritant are present which may be altered materially by catharsis. The discharges possess a peculiar fetid odor (mephitic) due to decomposing blood and degeneration. Loss of weight usually is a late symptom; this is frequent in the presence of metastasis and where episodes of chronic obstruction, with loss of protein, electrolytes and fluids, have occurred. Cachexia, anemia, and loss of strength are constant symptoms.

TREATMENT

Colostomy. It appears advisable to state that an artificial abdominal stoma, in certain instances, is of definite value being oftentimes a life-saving procedure. Limiting these remarks to malignancy of the bowel, colostomy possesses the greater value in the presence of acute or unrelieved colic obstruction and as a preliminary procedure to radical extirpation. Although all artificial abdominal stomata are abominations not at all desirable, the attendant distastefulness and inconvenience are not to be compared with its value in specific cases, it being quite true that a colostomy will temporarily improve the general health of the patient; obstruction is precluded with the added facility of cleansing the distal bowel. Its establishment also tends to diminish the distressing diarrhea and irritative discharges, lessens toxicity and offers the possibility of converting an inoperable into an operable growth. We have observed the latter result in numerous instances. It is the general consensus that with a chronic, obstructive lesion, preliminary colostomy lessens mortality following resection. There is no question of it being helpful in relieving tenesmus invariably associated with anal and low-lying rectal growths. While the procedure possesses no direct inhibitory effect on lesional growth, its establishment may add either months of happiness or an equal period of misery as a result. The estimated life expectancy is prolonged on an average of from six or seven months, which is concurred in by most reports.

It is the authors' uncompromised opinion, however, and not just the personal expression of a hypothesis, that colostomy has been a method born of expediency performed in numerous instances with needless frequency, even many times where not indicated in view of the presenting symptomatology, and at other times much too soon even if its subsequent performance were indicated. There is not the slightest doubt of its value in the presence of acute complete colic obstruction, but even here it is to be kept in mind that such incidence is confined to a mere 5 per cent. In the event of a presenting chronic or unrelieved obstruction, a proximal colostomy, cecostomy, appendicostomy, or transversostomy becomes a justifiable procedure, being considered but a temporary measure and closed following resection. In anal and low-lying rectal lesions within 6 cm. of the anal margin, an abdominal colostomy, as such, is an integral part of the extirpation and is definitely recommended. Colostomy is employed in acute colic obstruction; in some cases where upon exploration occlusion seems imminent; in the presence of unrelieved chronic obstruction as a preliminary to resection and as an integral part of extirpation for anal and low-lying rectal growths, and temporarily as in the Mikulicz-Rankin procedure for sigmoidal growths.

Many of our confreres have assumed the obligation to set aside substantiated records of studies and survival rates in an effort to defend an inherited or traditional method of procedure. Our colleagues have championed the perineal anus and speak of a perineal colostomy as being synonymous. A few have criticized the procedure without ever having performed such an operation and, perhaps in many instances, without taking the trouble to follow the results attained, either early or late. Were one to be captious and contentious, questioning the feasibility of the arguments which have been tendered, it might be stated that experience has shown that those who have sanctioned an abdominal colostomy, and who consider means to avoid an artificial stoma as "sentimental nonsense," have, in our experience, been the first to select a method to eliminate one for themselves and their family. Let it be definitely understood that it is not our purpose to condemn "colostomy," but rather to emphasize that the procedure, per se, is undertaken needlessly much too often. Furthermore, attention is invited to the end results achieved, both as to function, rate of survival, and incidence of local recurrence.

Radical Extirpation. The cardinal objective in the treatment of cancer is preservation of life and, for carcinoma of the bowel, this is best achieved by radical surgical extirpation. Therefore, limited or conservative methods for removal are definitely interdicted. By the same token, either roentgen or radium therapy should assume no justifiable inclusion in the attempted cure of cancer located in this region. One should be ever mindful that there is no existing criterion available in selecting the type of procedure. Furthermore, no one method is applicable in all cases. In each, the procedure should be adapted to the individual patient, and not the patient to the operation. In other words, a procedure that promises greater benefit accruing to the particular patient should be selected and, for this reason, the surgeon should be familiar with and competent to perform any or all of the accepted methods.

Our approach to malignancy of the lower bowel may be described as follows: (A) All growths involving the proximal two-thirds of the sigmoid are removed by, (1) the exteriorization method (Milkulicz-Rankin); or (2) immediate establishment of intestinal continuity, either by the open or closed technic. (B) Lesions involving the distal one-third of the sigmoid, rectosigmoid and ampullary portion of the rectum are extirpated by "proctosigmoidectomy without colostomy and with preservation of both the internal and external sphincters." (C) Those in the anal canal and lowest 3 cm. of the rectum are excised by methods in which the sphincter muscles are sacrificed and a permanent abdominal colostomy is established. The disposition of the 640 patients with malignancy is shown in Table 7.

It will be noted that among the 514 patients treated by resection there were 27 deaths, an over-all mortality of 5.2 per cent. The surgical approach conforming to locations A, B and C is shown in Table 8 (all statistics based on series to September 1, 1947).

Since the resective procedures listed under A and C are commonly employed, our dis-

TABLE 7. TREATMENT IN 640 CANCER PATIENTS.

	No. Pts.	No. Oper.	Operability Rate	Operation		Resection	Resectability		
				Deaths	Mortal.		Rate	Deaths	Mortal.
No procedure[1].	33	..	....	..	....	..	....	..	....
Fulguration ...	28	..	....	..	....	..	....	..	....
Exploration only	10	10	....	0	0	..	....	..	....
Palliative colostomy ...	34	34	....	5	14.7	..	....	..	....
Local excision[2]	21	21	....	0	0	..	....	..	....
Resection	514	514	....	27	5.2	514	80.3	27	5.2
Totals	640	579	90.4	32	5.5	514	80.3	27	5.2

[1] In 14 no procedure was recommended (too far advanced, brain tumors, active TB, coma); 19 refused operation or sought counsel elsewhere.

[2] Bevan alone or with radium implantation.

cussion will be directed toward the technic and results achieved by proctosigmoidectomy (B). It may be mentioned that Mandl[7] in 1922 observed that of 461 operations for cancer of the rectum, the sphincters were retained in 227 cases and concluded, "whenever possible, in situations where the tumor is a sufficient distance from the sphincters, these should be preserved." It may be observed that of 514 resections in our series, 344, or 66.9 per cent, were performed without any type of colostomy.

ABDOMINOPERINEAL PROCTOSIGMOIDECTOMY WITHOUT COLOSTOMY AND WITH PRESERVATION OF THE SPHINCTER MUSCLES

Technic: Abdominal Phase. The abdomen is opened through a left oblique incision 3 cm. above the inguinal ligament, beginning at a point to the right of the midline above the pubic spine and ending medial to the left anterior superior iliac spine. Ordinarily, the left anterior rectus sheath is divided. In a few instances we have detached both the rectus and pyramidalis muscles from the

TABLE 8. PROCEDURE BY LOCATION.

Type of Resection	Technic	No. Cases	Deaths	
			Cases	Percentage
Location A:				
Sigmoidectomy: multiple stage	Mikulicz-Rankin	32	3	9.3
Sigmoidectomy: single stage	Open or closed	28	2	7.1
Anterior resection	Hartmann	11	0	0
		71	5	7.04
Location B:				
Abdominoperineal proctosigmoidectomy ...	After Babcock	344	17	4.9
Location C:				
Abdominoperineal excision: 1-stage......	Miles	67	3	4.4
Abdominoperineal excision: 2-stage......	Lahey	6	1	16.6
Colostomy and perineal excision..........	Lockhart-Mummery	22	1	4.5
Perineo-abdominal excision	Gabriel-Turner	2	0	0
Perineal resection	Cuneo-Senequc	2	0	0
		99	5	5.05

pubic spine as suggested by Cherney. More recently we have returned to the classical left paramedian incision. The liver is examined for metastases. The median lumbar, upper and lower mesocolic areas are palpated for nodules, and the extent of the growth determined. The patient is placed in the exaggerated Trendelenburg position and the pelvic cavity is cleared of small intestine by hot packs. The left lateral leaf of the mesosigmoid is freely divided wide of any malignant infiltration the incision being carried downward to the rectovesical or rectouterine sulcus. In the course of the dissection, the left ureter, iliac, and the spermatic or ovarian vessels are exposed. The spermatic or ovarian vessels may be divided and ligated. The sigmoid with attached fat and mesosigmoid is mobilized toward the midline, thus clearing all gland-bearing areas in the vicinity of the iliac vessels. The peritoneum on the mesial side of the sigmoid is incised downward, continued around the right pelvic brim, and across the sulcus between the rectum and bladder or uterus to meet its fellow of the opposite side. By gently inserting the hand into the postrectal cellular space in the pelvis, *the lower pelvic sigmoid and rectum can be* stripped from the anterior surface of the sacrum as far as the sacrococcygeal articulation. The lateral ligaments are rendered prominent and divided. They may or may not require ligation. Anteriorly, the rectum is separated in the female from the upper and midportion of the vagina, and in the male from the base of the bladder as far as the prostate. Care should be exercised to avoid injury to the seminal vesicles and vas deferens. Ordinarily, transillumination is employed to visualize the inferior mesenteric, superior hemorrhoidal and sigmoidal vessels, and their communicating arcades. By so doing, greater precision can be exercised of those to be preserved, which is essential for the portion of the sigmoid to reach through the perineum. The necessary vessels are clamped, divided, and doubly ligated. The ligature usually is placed between the first and second sigmoidal branches. The point of section is determined by observing pulsating arteries or by the character of the bleeding from the small vessels on the surface of the [illegible] the level of resection are ligated. The [illegible] covered by the great omentum are dusted with 2.5 Gm. of sulfathiazole powder. More recently we have employed 100,000 units of penicillin instead. The peritoneum may be closed with a continuous suture of [illegible] chromic catgut, fascia with interrupted sutures of No. 32 gauge alloy steel wire and skin with No. 35 wire, although our preference is figure-of-eight wire suture after the method of Smead.

Perineal Phase. The patient is changed to the lithotomy position on the specially designed spinal mattress, and the rectum packed loosely with antisepticized gauze. The anal margins are clamped precisely in four divergent quadrants with Pennington hemostats and retracted. A circular incision is carried just through the anal skin (squamous epithelium) ⅛ inch distal to and below the anorectal (pectinate, dentate) line. The edges of the proximal incised skin are held taut, from which is teased the surrounding musculature by sharp and blunt dissection. This muscle—the subcutaneous bundle of the external sphincter—is readily prominent, while medially the lower margin of the internal sphincter is evident. *Briefly stated,* retraction of the anal margin has partially displaced and stretched this musculature but the anatomic relationship remains unchanged. As is known, the internal sphincter muscle descends for approximately two-thirds the length of the anal canal and is separated from the external sphincter (subcutaneous bundle) by the [illegible] better termed the "inter[illegible] [illegible] The initial incision wh[illegible] [illegible] below the anor[illegible] [illegible] by virtue of [illegible] easy to [illegible] small retractor into [illegible] internal sphincter [illegible] bundle [illegible] This must not [illegible] sphincter would [illegible] the subcutan[illegible] sphincter [illegible] [illegible] from [illegible] entire cir[illegible] clamps [illegible] discard[illegible] to the gut edges of the bowel in such a fashion as to occlude the lumen. These clamps are held together with a stout rubber band and drawn taut. The dissection is carried cephalad between the thin rectal wall medially and the internal sphincter laterally until the increment or body of this muscle becomes thinned; in other words, where it continues above as the circular coat of rectum. At this point the circular muscle is pierced and the longitudinal muscle divided together with a portion of the fibromuscular ring in order to enter an ill-defined cleavage plane between the levator muscle situated medially and above, and the deeper portions of the external sphincter (superficial bundle and profunda bundle) below. Thus, the Pennington hemostats are clamped to the rectal wall with attached levators for sacrifice, while the three bundles of the external sphincter and the internal sphincter have been retracted for preservation. Richardson retractors holding the musculature to be preserved are sharply angulated into the ischiorectal fossa to permit wide removal of the fat therein. Posteriorly, a single transverse incision through the fascia propria, which is closely adherent to the periosteum of the lower border of the sacrum, is all that is needed to mobilize the rectum. Anteriorly, the superficial and deep transverse perineal muscles are retracted and the line of cleavage cautiously followed between the rectum and prostate until the depth of the abdominal dissection is encountered. The seminal vesicles and vas deferens are again visualized. In the female, the rectovaginal septum is separated by blunt and gauze dissection until the divided portion above is reached. Mobilization has now been effected posteriorly and anteriorly. By making traction on the bowel, the levator muscles are placed on the stretch, provided of course the lateral ligaments were divided during the abdominal phase. The levators from front to back are clamped high and wide with large curved hemostats; they are then divided, and ligated. Mobilization being complete, the rectum and lower sigmoid are drawn through the wound and enclosed in a sterile towel. The segment of viable bowel must protrude well beyond the anal margin. The pelvis is inspected for bleeding points and an anterolateral pelvic floor is established by introducing two or three catgut sutures through the edges of the peritoneum. Occasionally this closure is made from the abdominal phase although in our experience the approximation effected is more precise from below. At no time is it advisable to place sutures between the peritoneum and the bowel although it is permissible to tack the fat tabs to the edges of the peritoneum.

One or two alloy steel wire sutures are placed interruptedly to approximate the stumps of the anterior levators. The sphincter muscles, which have not been incised nor divided in any phase, are permitted to assume their normal position. A curved, perforated, metal drain is inserted posteriorly along the sacrum to evacuate blood and serum during the first 24 hours. A slit-dressing saturated with tincture of benzoin is applied; the extruding bowel is slit at a point 7 cm. from the anal margin to allow for retraction and the bleeding points ligated at this level. A mushroom catheter is inserted into the lumen of the bowel to a point above the new pelvic diaphragm and held in place by the Daniels[8] clamp. The metal drain is removed at the expiration of 24 hours. Irrigation of the bowel through the catheter is begun the morning after operation, using a few ounces of warm saline solution at four-hour intervals. It is continued until the time of the first satisfactory evacuation which usually is the third day. The clamp is then removed and the catheter withdrawn.

Management of Redundant or Protruding Bowel Stump. The portion of the bowel distal to the Daniels clamp will slough off because of pressure necrosis. The remaining gut ordinarily will retract to the anal margin and draw up the anal epithelium to form a normal anal canal and normal anorectal line. If such does not occur the patient is taken to the operating room on the seventh or eighth day and the bowel removed. Using the jackknife position with the patient under sodium pentothal or spinal analgesia the anal skin, which has become puckered and rolled, is teased from the bowel, gently mobilized and retracted. The gut is drawn taut and a Payr clamp placed coronally about the bowel which is excised with the Paquelin cautery. The edges of the freed anal skin are then lifted to their normal location and tacked to the edges of the mucous membrane of the bowel, using fine catgut in mattress fashion.

Mortality. The mortality from abdominoperineal proctosigmoidectomy is 4.9 per cent; the causes are as follows:

Peritonitis	5
Pulmonary embolism	3
Myocardial failure	2
Cerebral thrombosis	2
Uremia	1
Obstruction and pneumonia	1
Diabetic coma	1
Hemolytic transfusion reaction	1
Anesthesia (autopsy)	1
Total	17 (4.9%)

Since the radicability of "proctosigmoidectomy" has been questioned, it may be well to consider various phases of the technic pertinent to wide removal of the gland-bearing areas. Abdominoperineal proctosigmoidectomy as it should be performed calls for and permits wide excision of the mesosigmoid and iliac glands, wide removal of the pelvic peritoneum, wide removal of the perirectal tissues and gland-bearing areas, and wide excision of the levators. It has been reported that the usual point of ligation in performing the Gabriel (perineoabdominal)[9] and Miles operations (abdominoperineal) is 25 cm. (10 inches) above the coccyx tip; in proctosigmoidectomy the point of ligation has averaged between 38 and 55 cm. Such high point of ligation permits extended removal. In the Miles operation the usual operator will divide the peritoneum conservatively in each gutter and especially in the pelvis close to the bowel for the purpose of later establishing a diaphragm; in proctosigmoidectomy greater removal is permitted since no complete floor is made. By the same token, a few report utilization of the iliac sigmoid as a midline colostomy to extend the radicability of the Miles procedure; in proctosigmoidectomy, mobilization of this portion of the bowel (iliac sigmoid and lower descending colon) is routinely made.

Survival Rate Following Proctosigmoidectomy. It should be mentioned that Eiselsberg of Vienna, Sauerbruch of Munich, Payr of Leipzig, Mandl of Vienna, Gulede of Jena and Kirschner of Tübingen, reported a slightly higher incidence of three and five year cures where the muscles were not sacrificed. Similar published articles by Eichhoff and Pribram are to be found.

Only a small number of our patients can be evaluated for the period over five years, but the rate compares very favorably with other methods. The rates of resectability and mortality (previously cited) and the fact that resection was instituted for palliation as well as for cure should be noted.

By employing the method suggested by Newman of the British Ministry of Health[10] and by Dukes,[11] the five year survival rate is computed from the customary fraction:

$$\frac{\text{alive at 5 years} \times 100}{\text{resection deaths, less those untraced and died of other causes}}$$

Of 76 patients subjected to abdominoperineal proctosigmoidectomy five or more years ago, our incidence of survival (living and well 5 years or more) is 52.6 per cent. It is interesting to note that the records of these 76 patients showed that the histopathologic reports in 20 instances conformed to Grade A (mural penetration). Of this number 4 were Grade I, 15 were Grade II, and 1 was ungraded. Suffice it to state that 93.3 per cent of patients in this category were alive and well at the expiration of five years.[12]

The subject of recurrent cancer and particularly local recurrence is interesting but it presents a problem difficult of accurate determination. While this phase has been adequately reported elsewhere[13] it should be mentioned that the local recurrence rate based on those patients in whom resection (proctosigmoidectomy) was performed five or more years ago, is 17.9 per cent. The incidence of recurrence has been summarized in Table 9.

TABLE 9. INCIDENCE OF RECURRENCE.

Author	Resections	Oper. Deaths	Survival Rate 5 Yrs. or More	Recurrence Not Specified Cases	%	Recurrence Local Cases	%
Lockhart-Mummery[14] ..	230 (performed 5 yrs. or more)	?	52%	100	43.4	?	?
Lynch and Hamilton[15]..	50 (performed 5 yrs. or more)	5	53.1%	16	35.5	12	26.6
Hayden[16]	82	11	....	27	38.0	?	?
Colcock[17]	125 (performed 5 yrs. or more)	11	47.5%	54	52.4	?	?
Johnson[18]	38	7	36.8%	15	39.4	?	?
Gilchrist and David[19]...	112	12	51.8%	35	31.2	?	23.2

TABLE 10. INCIDENCE OF RECURRENCE WHERE SPHINCTER MUSCLES ARE PRESERVED.

Author	Resections	Oper. Deaths	Survival Rate 5 Yrs. or More	Recurrence Not Specified Cases	%	Recurrence Local Cases	%
Wangensteen[20] (Abdomino-anal pull-through)	67 (51 curative)	4	....	..	....	..	....
Bacon[21] (proctosigmoidectomy)	76 (5 yrs. or more)	5	52.6%	23	34.3	12	17.9

Sphincter Continence. Our confreres past and present have reported "satisfactory" results with their methods of sphincter muscle preservation. Mandl,[22] for example, an ardent advocate of the Hochenegg method, mentioned that of the cases in which circular suture was performed, 19.3 per cent of the patients were discharged as continent; complete control was effected after a period of time in 49.4 per cent. Following the "pull-through" method, the number of continent patients increased from 58.3 per cent to 64.5 per cent. In contrast, however, is the publication by Koerbl of the Eiselsberg Clinic who observed complete continence in 36 per cent employing Hochenegg technic and 66 per cent with the Kraske method. Gersuny recorded satisfactory continence in 75 per cent of his cases. DuPan, a pupil of Kocher, reported that 8 patients had complete and 32 partial control, 11 were completely incontinent. A cursory glance will disclose these results to be far from ideal. Were these percentages of continence representative of our own cases today, the authors would most certainly relegate proctosigmoidectomy, as a poor experiment, to the limbo of forgotten episodes of the past.

The internal sphincter is equally important. Designed to aid in the expulsion of feces, it also assists to occlude the anal aperture by tonic contraction. This muscle, representing an aggregate of inner circular muscle fibers of the rectum into a single component, measuring 2 to 5 mm. in thickness and 1 to 3 cm. in width, and innervated primarily by the sympathetic and parasympathetic nerves, maintains perfection in control, especially of flatus and liquid feces.

According to Howell,[23] the force of the tonic contraction of the internal sphincter is 30 to 60 per cent less than that of the external sphincter, or 35 to 40 per cent according to Math.[24] Like the rest of the rectal musculature, the internal sphincter muscle receives both contractile (motor) and inhibitory (Gaskell) fibers. Thus, this muscle is thrown into a state of contraction by stimulation of the pelvic nerve parasympathetic (craniosacral autonomics) motor, and by the same token is inhibited by stimulation of the hypogastric, sympathetic (thoracolumbar autonomics). The voluntary inhibitory center is located in the brain, while the defecatory or reflex center is situated in the cord opposite the base of the first lumbar vertebra in a tip of the cord known as the conus medullaris.

As has been shown, the internal sphincter muscle does not exhibit fatigue as does the external sphincter. It is our opinion that the somatic innervation to the external sphincter is but minimally impaired although the visceral supply to the internal sphincter is interrupted. How, then, does one explain the fact that patients following this type of operation develop a "reflex urge" for stool, do not "soil" during wakeful or sleeping hours and do not wear protective pads? As determined by Brown and Robinson,[25] voluntary control over defecation involves only the external sphincter which is not tonic but contracts reflexly in the course of the flexion reflex and in synergy with the remainder of the abdominal parietes. Provided the delivery of fecal material is adequate, the mechanism of defecation depends primarily upon the reaction of the rectum to distention, which results reflexly in relaxation of the sphincter. It has been shown that postural tone of the internal sphincter is dependent upon a local mechanism probably related to the innervation. Change in tonicity of this muscle reflects only the degree of activity of the rectum and possibly the distal colon. The reciprocal relationship between the rectum and the internal sphincter is the basis of a mechanism which can secure coordinated evacuation The stimulus to allow its occurrence in distention of the rectum, and sufficient relaxation of the sphincter to allow some passive evacuation of fluid under its own pressure does not occur unless active reciprocal contraction of the rectum provides the driving force of the reaction. Such is in accord with the view of Best and Taylor.[26] The investigations of Goltz and Ewald[27] on dogs are very interesting and bear some influence on our problem. These workers, who are able to keep their animals alive for years after transection or destruction of the spinal cord below the seventh cervical segment, observed that while diarrhea was interposed, defecation gradually became normal: One or two evacuations were noted daily, and on each occasion the rectum was well emptied. White and Smithwick[28] found that after sympathetic denervation of the normal rectum and colon no alteration was visible either in basic tone of the bowel, its peristaltic activity, or its sensory acuity. Perhaps the explanation is only hypoethetical but it does seem possible in addition to the preserved internal sphincter for the circular muscle coat of the mobilized sigmoid brought down to the anus to assume postural tone in response to reflexes from the bowel above even though the tone be variable.

It is our opinion that the visceral innervation is interrupted, but the presence of "local nerve plexuses" as postulated by Jenkins[29] cannot be ignored. Certainly some degree of postural tone is manifest following proctosigmoidectomy. Apparently the accumulation of fecal material as the result of a normal diet provides distention of the new "ampullary sigmoid," resulting in an "urge for stool." Patients invariably will experience a sufficient period, such as a half hour or more to evacuate the bowel. Continued observations must be made and in this respect the dissections undertaken on the innervation in this region may throw further light especially on a hitherto unrecognized source.

Abdominal wound infection and dehiscence have been infrequent complications, in fact, in a group of 292 consecutive cases there were three instances (1 per cent) of wound infections. To a great measure, we believe this has been due to the use of sulfonamides, penicillin, and streptomycin, to the maintenance of adequate protein and vitamin C levels and Babcock's alloy steel wire.

SUMMARY

A series of 640 patients with malignancy of the anus, rectum and sigmoid colon is reported. Distribution of the lesions according to location, age, histologic types and gradation of the tumor is cited. The incidence of

nodal metastases pertinent to the circumferential involvement, the percentage of metastases in relation to the segment involved, and the incidence of metastases in accordance to gradation of the tumor is described. The symptoms of bowel malignancy relevant to location, with the respective percentages is detailed. The surgical approach to the management of carcinoma is discussed and recommendations made, according to location of the growth. Resection was instituted in 514 cases with 27 deaths, a mortality of 5.2 per cent. The technic of "abdominoperineal proctosigmoidectomy, without colostomy and with preservation of both the external and internal sphincter muscles" was employed in 344 procedures. Technic of the procedure is described in detail. In this group there were 17 deaths, a mortality of 4.9 per cent. A survival rate of 52.6 per cent for five years and more is reported; the five-year cure rate for grade "A" tumors, according to mural penetration, is 93.3 per cent. The incidence of local recurrence (17.9 per cent) is cited and sphincter function evaluated.

SOMMAIRE

Une série de 640 patients avec malignité de l'anus, du rectum et de l'anse sigmoïde est rapportée. Aussi, la distribution des lésions selon la localisation, l'âge, le type histologique et le degré de la tumeur est citée. L'incidence de métastase noduleuse pertinent à l'envahissement circonférentiel, le percentage de métastase à l'égard du segment entraîné et l'incidence de métastase selon le degré de la tumeur sont décrits. Les symptômes de la malignité des intestins pertinent à la localisation avec leurs percentages sont détailés. L'approche chirurgicale au traitement du carcinome est discutée et des recommandations sont faites suivant la localisation de la tumeur. Résection était instituée en 514 cas avec 27 morts, 5,2 pour cent de mortalité. 344 procédé étaient pratiqués par la technique de la "proctosigmoïdectomie abdomino-périneale sans colostomie et avec la préservation des deux sphincters, l'extérieur et l'intérieur." La technique de ce procédé est décrite en détail. En ce group il y avait 17 morts, une mortalité de 4,9 pour cent. Une fréquence des survies de 52,6 pour cent pendant cinq années ou plus est rapportée; pour les tumeurs de degré "a", selon la pénétration pariétal, la proportion des guérisons de cinq années est 93,3 pour cent. L'incidence de récurrence locale (17,9%) est citée et la fonction des sphincters est evaluée.

SUMARIO

Se ha presentado en este articulo una serie de 640 casos de tumores malignos de la region ano-rectal y del colon sigmoideo. Se cita especialmente la distribucion de las lesiones de acuerdo con su localidad, tipo histologico, gradacion del tumor y segun la edad del paciente. Se ha descrito y clasificado la incidencia de las metastasis nodulares y su porcentaje en relacion con el segmento intestinal afectado y de acuerdo con la gradacion del tumor. Se ha dado en detalle la semiologia de los tumores malignos del intestino grueso segun su localizacion y porcentaje. Se ha discutido la tecnica operatoria aplicable al tratamiento de estos tumores de acuerdo con su localizacion y modo de crecimiento. Se practico la reseccion en 514 casos de los cuales 27 terminaron fatalmente; o sea una mortalidad de 5.2%. Del total 344 fueron tratados por la procto-sigmoidectomia abdomino-perineal, sin colostomia y con preservacion de los fibras musculares del esfincter interno y externo del ano; se describe en detalle la tecnica operatoria practicada. En este grupo la mortalidad fue de 4.9%. 52.6% han sobrevivido mas de cinco años y de estos 93,3% el tumor pertenecio al grado A de acuerdo con el grado de penetracion mural. Se cita la incidencia de las recurrencias locales (17.9%) y tambien se ha evaluado la funcion del esfincter anal post-operatoriamente.

RIASSUNTO

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extent of the pathologic changes need not be directly proportional to the changes at the primary focus of the disease itself (Graser). Very slight changes in the appendix itself or in its neighborhood can give rise to extensive suppurating thrombosis with accompanying hepatic abscesses. On the other hand, even large destructive appendiceal changes do not always cause thrombosis in the mesenteric veins.

The cases recorded in the literature show that pylephlebitis with its sequel of liver abscesses may develop from inflammation of *the appendix in any phase of the disease.* Pylephlebitis has been found in association both with a mild acute inflammation and with gangrenous and perforated cases. It has occurred in addition, as was mentioned earlier, as a complication of chronically recurring appendicitis. Heyd[12] claims to have discovered peribiliary and periportal changes in liver parenchyma in connection with chronic catarrhal appendicitis.

Nevertheless, judging from the literature, the complication is incomparably more common as a sequel to gangrenous appendicitis, especially periappendicular abscesses.

Petrén concluded that the possibility of liver infection is greater with the first appendiceal attack than with recurrent attacks and ascribes this to the protection afforded by the adhesions and scar formations in the mesenteriolum left by an earlier attack of appendicitis. He also concludes that liver abscesses occur especially in conjunction with nonoperated inflammations of the appendix not operated upon and those treated surgically in a late phase, in other words, in cases treated negligently.

Among the explanations given to account for the rare occurrence of the complication that of Otschkin seems the most plausible. His theory is that frequent valves in the small veins—which become less numerous the nearer we get to the portal vein (Spalteholz) —*prevent or retard the progress of the thrombosis* or the progress of the infectious particles of the thrombus. Colp, on the other hand, maintains that in an early phase of the inflammation the liver cells themselves are capable of neutralizing an infection in the liver. It seems probable that both factors have a share in the pathogenesis of pylephlebitis and liver abscess.

SYMPTOMS AND SIGNS

The clinical picture of pylephlebitis is dominated by symptoms of sepsis. In all descriptions of the disease chills are mentioned as of most frequent occurrence, from two to three chills a day being most common. There is a wide range of temperature in association with these chills (96.8° to 104° F.).

The peritoneal symptoms in the appendiceal region are not always in proportion to the severely impaired general condition and their relatively small importance, as compared with corresponding symptoms of an uncomplicated acute appendicitis, may be ascribed to their transitory character, lack of intensity, and especially their relative mildness in proportion to the gravity of the patient's general condition (Otschkin).

The abdominal distention commands attention, especially since coincident symptoms of enteric paresis are absent. The distention is greatest in the epigastrium and under the right costal arch. Pain in the same region often occurs either spontaneously, or is elicited by palpation. The liver is often enlarged and remarkably tender—a sign that the infection has already invaded the organ.

Edema in the region of the lower ribs, in the midaxillary line, is a symptom mentioned only by Eliason. It is best ascertained by picking up at the same time the soft parts covering the lower ribs on both sides. They are felt to be thicker on the right than on the left.

A yellow tinge of the sclerae becomes apparent with invasion of the liver by the inflammatory process. A rapidly developing icterus accompanied by persisting chills and septic fever must be considered of grave prognostic significance.

A leukocytosis (between 12,000 and 20,000) with shift to the left is characteristic.

Not infrequently, degenerative changes in the kidneys occur, and albumin, red blood cells and cylinders may be present in the urine. Destructive changes in the spleen have been common findings at necropsy. Less common localizations are metastatic abscesses in brain, lungs, kidneys and subcutaneous tissue

Pylephlebitis and Liver Abscesses Due to Appendicitis*

YRJÖ SORO, M.D.
HELSINKI, FINLAND

THE channel by way of which the infection travels from the appendix through the mesenteric and portal veins into the liver was described in the latter half of the past century by several authors. In the present century the disease has been described at some length by Pólyo,[24] Braun,[3] Petrén,[23] Eliason,[7] Colp,[6] and Otschkin[22] among others. In Finland only Krogius[14] reported such infection, 5 cases of pylephlebitis in his material being mentioned without detailed description.

Generally the complication has occurred in a typical form in association with an acute inflammation of the appendix, but Braun, and Sázavský,[27] mention it also as a complication of chronically recurring inflammations. In these cases the recurrence would be accompanied by coincident reversible pylephlebitis with changes in the liver.

This complication can also occur in association with other diseases of the abdominal cavity such as tropical dysentery (Petrén), typhoid-paratyphoid (Madelung[18]), cholecystitis, subcutaneous rupture of the liver (Maingot), etc. As its occurrence as a sequel of appendicitis is most important from the practical point of view, the present discussion will be restricted to this aspect of the question.

INCIDENCE

The relative rareness of this complication of appendicitis is demonstrated in Table 1, representing figures culled from the literature.

From these figures the relationship of pylephlebitis to appendicitis seems to vary considerably in the records of different authors, the mean being 0.40 per cent.

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According to Aschoff, acute appendicitis is most commonly caused by enterococci, nonhemolyzing streptococci, pneumococci, or species of *E. coli*. Von Redwitz,[25] on the other hand, found vascular changes in the wall of the inflamed appendix to be of very common occurrence. Perivascular abscesses are present, likewise periarteritis, panarteritis, periphlebitis, and phlebitis with incipient or already developed thrombic formations. Phlebitis and accompanying thrombosis travels from the inflamed appendix to the veins of its mesenteriolum (Feriz,[8] Levin[17]). From thence the inflammation is carried to v. ileocolica, v. mesenterica superior and finally to the portal vein with its branches in the liver.

Exceptions to this schematic progress of the infection occur in such a manner that particles may detach themselves from the infected thrombus in any phase, pass over the following stages and reach the thin hepatic branches of the portal vein thus causing liver abscesses embolically (Läwen, Otschkin).

Colp, Eliason, and others made very thorough pathologic studies of their own material. They found that thrombosis, when forming and dissolving in the mesenteric veins, undergoes the phases characteristic of thrombic formations in other veins.

It should be noted also that the severity of the symptoms of the complication, or the

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Baradulin, 1913	417	1
Brütt, 1922[4]	2500	15
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Krogius, 1910	1283	5
Makino, 1935[20]	737	5
Otschkin, 1932	1692	15
Petrén, 1913	4204	15
Sonnenburg, 1905[28]	3480	3

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* From the First Surgical Clinic, University of Helsinki.

extent of the pathologic changes need not be directly proportional to the changes at the primary focus of the disease itself (Graser). Very slight changes in the appendix itself or in its neighborhood can give rise to extensive suppurating thrombosis with accompanying hepatic abscesses. On the other hand, even large destructive appendiceal changes do not always cause thrombosis in the mesenteric veins.

The cases recorded in the literature show that pylephlebitis with its sequel of liver abscesses may develop from inflammation of the appendix in any phase of the disease. Pylephlebitis has been found in association both with a mild acute inflammation and with gangrenous and perforated cases. It has occurred in addition, as was mentioned earlier, as a complication of chronically recurring appendicitis. Heyd[12] claims to have discovered peribiliary and periportal changes in liver parenchyma in connection with chronic catarrhal appendicitis.

Nevertheless, judging from the literature, the complication is incomparably more common as a sequel to gangrenous appendicitis, especially periappendicular abscesses.

Petrén concluded that the possibility of liver infection is greater with the first appendiceal attack than with recurrent attacks and ascribes this to the protection afforded by the adhesions and scar formations in the mesenteriolum left by an earlier attack of appendicitis. He also concludes that liver abscesses occur especially in conjunction with nonoperated inflammations of the appendix not operated upon and those treated surgically in a late phase, in other words, in cases treated negligently.

Among the explanations given to account for the rare occurrence of the complication that of Otschkin seems the most plausible. His theory is that frequent valves in the small veins—which become less numerous the nearer we get to the portal vein (Spalteholz)—prevent or retard the progress of the thrombosis or the progress of the infectious particles of the thrombus. Colp, on the other hand, maintains that in an early phase of the inflammation the liver cells themselves are capable of neutralizing an infection in the liver. It seems probable that both factors have a share in the pathogenesis of pylephlebitis and liver abscess.

SYMPTOMS AND SIGNS

The clinical picture of pylephlebitis is dominated by symptoms of sepsis. In all descriptions of the disease chills are mentioned as of most frequent occurrence, from two to three chills a day being most common. There is a wide range of temperature in association with these chills (96.8° to 104° F.).

The peritoneal symptoms in the appendiceal region are not always in proportion to the severely impaired general condition and their relatively small importance, as compared with corresponding symptoms of an uncomplicated acute appendicitis, may be ascribed to their transitory character, lack of intensity, and especially their relative mildness in proportion to the gravity of the patient's general condition (Otschkin).

The abdominal distention commands attention, especially since coincident symptoms of enteric paresis are absent. The distention is greatest in the epigastrium and under the right costal arch. Pain in the same region often occurs either spontaneously, or is elicited by palpation. The liver is often enlarged and remarkably tender—a sign that the infection has already invaded the organ.

Edema in the region of the lower ribs, in the midaxillary line, is a symptom mentioned only by Eliason. It is best ascertained by picking up at the same time the soft parts covering the lower ribs on both sides. They are felt to be thicker on the right than on the left.

A yellow tinge of the sclerae becomes apparent with invasion of the liver by the inflammatory process. A rapidly developing icterus accompanied by persistent chills and septic fever must be considered of grave prognostic significance.

A leukocytosis (between 12,000 and 20,000) with shift to the left is characteristic.

Not infrequently, degenerative changes in the kidneys occur, and albumin red blood cells and cylinders may be present in the urine. Destructive changes in the spleen have been common findings at necropsy. Less common localizations are metastatic abscesses in brain, lungs, kidneys and subcutaneous tissue

Pylephlebitis and Liver Abscesses Due to Appendicitis*

YRJÖ SORO, M.D.
HELSINKI, FINLAND

THE channel by way of which the infection travels from the appendix through the mesenteric and portal veins into the liver was described in the latter half of the past century by several authors. In the present century the disease has been described at some length by Pólyo,[24] Braun,[3] Petrén,[23] Eliason,[7] Colp,[6] and Otschkin[22] among others. In Finland only Krogius[14] reported such infection, 5 cases of pylephlebitis in his material being mentioned without detailed description.

Generally the complication has occurred in a typical form in association with an acute inflammation of the appendix, but Braun, and Sázavský,[27] mention it also as a complication of chronically recurring inflammations. In these cases the recurrence would be accompanied by coincident reversible pylephlebitis with changes in the liver.

This complication can also occur in association with other diseases of the abdominal cavity such as tropical dysentery (Petrén), typhoid-paratyphoid (Madelung[18]), cholecystitis, subcutaneous rupture of the liver (Maingot), etc. As its occurrence as a sequel of appendicitis is most important from the practical point of view, the present discussion will be restricted to this aspect of the question.

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cent, were complicated by pylephlebitis. These complicated cases were distributed as shown in *Table 2.*

TABLE 2

Type of Appendicitis	Pylephlebitis Cases
Acute simple	4
Acute gangrenous	8
Acute gangrenous, perforated *	6
Acute gangrenous, perforated. plus diffuse peritonitis	2
Undetermined	1

* Peritonitis circumscripta (abscessus periappendicularis)

Thus the majority occurred in association with gangrenous or perforated appendicitis. Pylephlebitis did not complicate chronic appendicitis, but in a great number of the cases recurrent appendiceal attacks were represented.

Of the 6.410 cases of acute appendicitis 278 were fatal. Pylephlebitis and liver abscesses caused death in 20 (7 per cent). This figure approaches the 5 per cent cited by Pólya and Chiari. Only one patient with pylephlebitis recovered.

Symptoms and Signs. Chills occurred in the 21 cases, beginning at onset of the disease or two or three days after onset. The temperature curve suggested a septic condition and rapid fluctuations of three or four degrees (Celsius) were common. Icteric color was noted in 7 cases, but judging from the remittent character of the septic temperature many others must have displayed a subicteric color of the complexion though it was not specifically mentioned in the case history. Blood counts were too infrequently charted to be of conclusive value. Where the septic state was sufficiently far advanced urinalysis pointed to destructive changes in the renal tissue. There was tenderness in the right iliac fossa in 12 cases. Distention and bulging in the epigastrium occurred in 15 cases, while enlargement of the liver was noted in 8.

Diagnosis. In the majority a clinical diagnosis of pylephlebitis was made on the basis of the primary appendiceal disease and the associated liver symptoms and septic condition. Liver puncture was resorted to in 10 cases, in 2 with a negative and in 8 with a positive result. The diagnostic value of liver puncture is lessened by the fact that a negative result by no means proves the absence of liver abscess since it is often a matter of chance whether the needle enters the abscess cavity. Though a negative result was obtained in 2 cases, liver abscesses were nevertheless discovered in both at operation.

Necropsy was performed in 12 cases. Solitary purulent foci were discovered in the liver in 2 cases. In 9, numerous abscesses of various sizes were found, mainly in the right lobe, multiple abscesses occurring more often than solitary purulent foci. This fact should be kept in mind when reason is sought for the high mortality in these cases complicated by pylephlebitis.

Treatment. Altogether, 31 operations were performed, including appendectomies, incision of periappendicular abscess, incision of hepatic abscess, and others. Operations upon the appendix alone were performed 14 times. Braun's ligation and venous resection was performed once (Prof. Kalima) which would seem to indicate that in routine appendectomies incipient thrombosis of the mesenteriolum, i.e., incipient pylephlebitis, has not always received sufficient attention.

There were 11 operations upon hepatic abscess. It should be mentioned that the only patient who recovered belonged in this group.

CONCLUSIONS

The high mortality in pylephlebitis and subsequent liver abscess must be ascribed to the severe septic condition incident to the disease. Sulfonamides did not become available to this series of cases. With the advent of chemotherapy (sulfonamides and penicillin) *septic conditions show a marked decrease.* When used as supportive measures in conjunction with surgery they can be considered as almost epochal weapons in the treatment of this grave disease. That these drugs share in the prevention of pylephlebitis seems to be supported by the fact that since 1935 in the extensive series of appendicitis cases in our hospital, a single confirmed case of pylephlebitis has occurred. The patient received sulfa preparations during several febrile episodes following appendectomy.

On the basis of these observations there seems to be no reason why these substances, when used in conjunction with routine early appendectomy, should not have a share in the practically complete clinical disappearance of pylephlebitis. In the prophylaxis of pylephlebitis an appendectomy undertaken at the earliest possible moment remains, of course, of primary importance.

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Surgical Thoracic Tumors[*]

MOSES BEHREND, M.D., F.A.C.S., F.I.C.S., AND
ALBERT BEHREND, M.D., F.A.C.S., F.I.C.S.
PHILADELPHIA, PENNSYLVANIA

IN the category of thoracic tumors may be considered those of the mediastinum, the lungs, and the pleura. Superficial tumors of the thorax and growths involving the esophagus will not be considered in this paper.

Tumors of the mediastinum frequently are malignant. They occur in young children and in those at or near puberty, but there is no age limit. These tumors are mainly sarcomas or those related to Hodgkin's disease and the lymphoblastomas. Of the benign tumors, lipomas and dermoid cysts are encountered most commonly but the latter frequently become malignant if not removed.

Primary tumors of the pleura are rare and usually are malignant endotheliomas. Growths in this location may be secondary to a primary tumor of the lung or metastatic from a carcinoma or sarcoma elsewhere.

Benign tumors of the lung comprise cysts, fibromas, neurofibromas, fibrochondromas and adenomas. Many tumors of the lung are discovered following routine x-ray examination. General practitioners and clinicians must understand that a routine x-ray examination of the chest should be made even if there are no symptoms referable to this area. The survey film method now used so extensively in industry and schools should be routine for all patients admitted to our hospitals. The comparatively large number of cases of tuberculosis discovered by this method is important to the health and welfare of the community. No examination is complete without an x-ray of the chest and it should be incumbent upon every hospital to give this service.

HODGKIN'S DISEASE OF THE MEDIASTINUM

Hodgkin's disease of the mediastinum commonly is manifested as a confluent enlargement of glands about the hilum. These have a characteristic appearance on the roentgenogram and the diagnosis is established by biopsy of a cervical or axillary lymph node. When the diagnosis can be confirmed in this way, thoracotomy is unnecessary, for surgical removal of the glands does not effect a cure. Unusual cases of Hodgkin's disease are encountered occasionally and illustrated by the following case.

Case 1. F. W. S. Age 32. The patient was operated upon by one of us (M. B.) 11 years ago for a tumor of the anterior mediastinum. Roentgenographic diagnosis was probable sarcoma. After excision of the first and second ribs anteriorly, the tumor was removed and microscopic examination revealed Hodgkin's disease. In April, 1947, the patient complained of pain in the left chest, the side that was operated upon before. On physical examination there was a bulge over the area between the ninth to twelfth ribs (Fig. 1). This mass was not painful. Laboratory studies of the kidneys and spleen were negative. Upon admission to the hospital 250 cc. of clear fluid were removed from the pleural cavity. On x-ray examination after the aspiration no definite tumor was visible. For a period of two weeks she ran a febrile course ranging from 100° to 102° F. This temperature gradually subsided until it was normal upon discharge. Since her discharge from the hospital she has been receiving x-ray treatment.

LYMPHOBLASTOMAS OF THE MEDIASTINUM

Lymphoblastomas usually affect children. They are very malignant and usually not radiosensitive. If they respond to irradiation, remission is temporary and recurrence is the rule. The pressure of these tumors upon the mediastinum in young individuals causes dyspnea. The tumor usually is accompanied by pleural effusion which often is hemorrhagic and adds to the discomfort already present. In severe cases the young patient is required to sit up in bed. The veins of the neck and chest are distended, the outlines of the face are distorted, the pulse is rapid, and often there are signs of impending death. Operation may be performed as was done in two of our cases. Biopsy was all that could be obtained in

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[*] Read before the Surgical Section, Medical Society of the State of Pennsylvania, Pittsburgh, September 17, 1947.

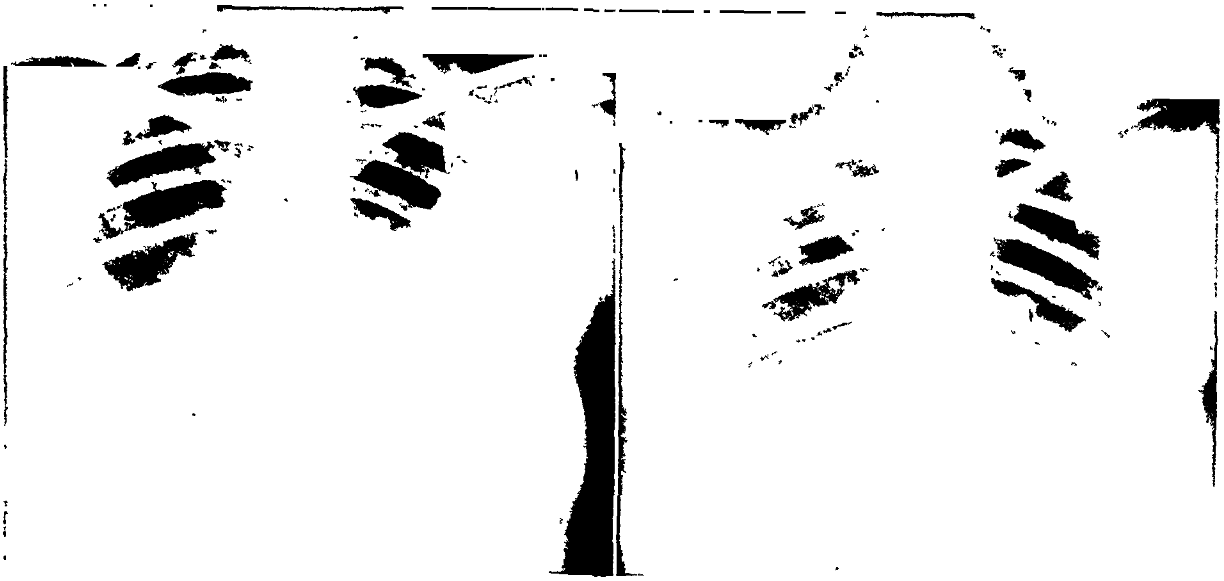

Fig. 1. Case F. W. S. Note the absence on left side of first and second ribs due to a previous operation 11 years ago. Now, left, pleural effusion which was aspirated; right, after aspiration no evidence of tumor visible.

either case. The tumors were irremovable. Both patients died within a few months after the inception of the symptoms.

Comment. Case 2. The children were H. S. D., aged 11, and R. C., aged 9 (Fig. 2). Both complained of symptoms only a short time before admission to the hospital. The growths occupied almost the entire mediastinal space. It is curious that symptoms did not develop earlier. The prognosis for cure in malignant tumors of the chest in children is absolutely hopeless. We now consider the finding of malignant cells in the chest fluid as evidence of inoperability.

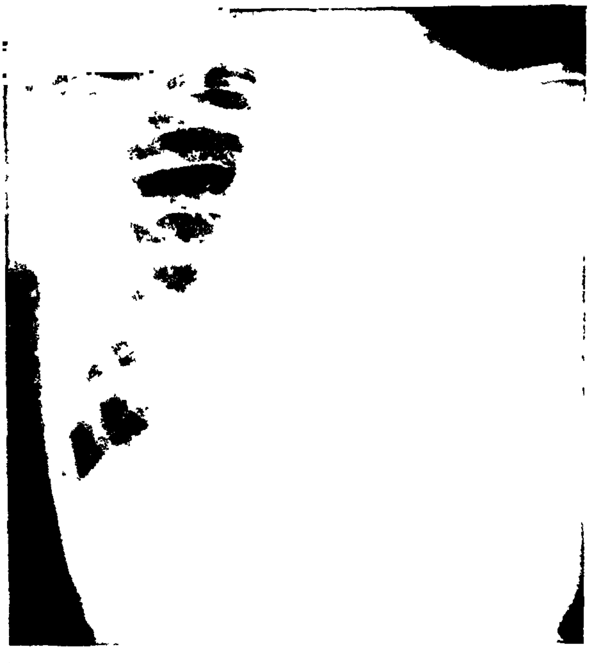

Fig. 2. Case R. C. A lymphoblastoma with effusion filling almost the entire left half of the thorax.

SARCOMAS OF THE MEDIASTINUM

The symptoms of these tumors are insidious in onset because as a rule they are of slow growth. Most of them occur between the layers of the parietal and visceral pleura. When sarcoma attacks the sympathetic nerve trunks, referred symptoms may be present for a long time before help for the relief of the symptoms is requested. A case in point is recorded.

Case 3. B. M. Age 19. Student nurse. Patient was admitted to the Nurses Infirmary on Dec. 3, 1946. She was referred by Dr. Joseph C. Doane. For two years the patient had constant pain in the left arm and axilla. At that time roentgenograms suggested the possibility of an enlarged thyroid gland. Upon readmission on Dec. 3, 1946, she complained of severe pain beneath the posterior aspect of both arms. Weakness of the left arm had been noted for almost two months. Apparently there was some fulness in the supraclavicular region. Roentgenograms at this time revealed the fact that the tumor had increased in size. It occupied a posterolateral position at the

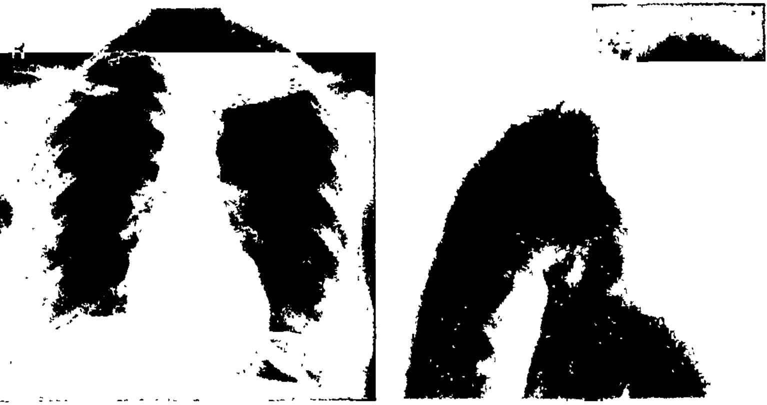

Fig. 3. Case B. M. Anterior and lateral views of a sympathoblastoma in a posterolateral position at the apex of the chest.

pex of the chest (Fig. 3). The urine showed o abnormalities. The hemoglobin was 11.5 Gm., ed blood cells, 3,610,000; white blood cells, 8,400; olymorphonuclears 83, mononuclears 3, lymphoytes 13, eosinophils 1, filamented neutrophils 96, onfilamented neutrophils 4. Prior to operation, hich was performed on Dec. 9, 1946, there was o difficulty in walking; nor was there interference ith coordinated movements either of the arms, egs, or hands. The operation was performed nder intratracheal anesthesia. A posterolateral incision was made, extending from the third rib to the anterior axillary line. The ribs from the third to the eighth were incised at the paravertebral border. The sixth rib was removed. There was pressure necrosis of the ribs with possible extension of the disease. The tumor was enucleated and the segment of the upper lobe of the lung to which it was attached was resected. On Dec. 14, 1946, five days after operation, both legs felt numb. She was unable to get out of bed which she had done prior to this day, as we insti-

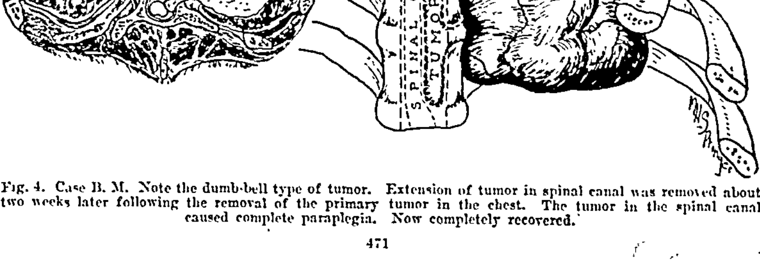

Fig. 4. Case B. M. Note the dumb-bell type of tumor. Extension of tumor in spinal canal was removed about two weeks later following the removal of the primary tumor in the chest. The tumor in the spinal canal caused complete paraplegia. Now completely recovered.

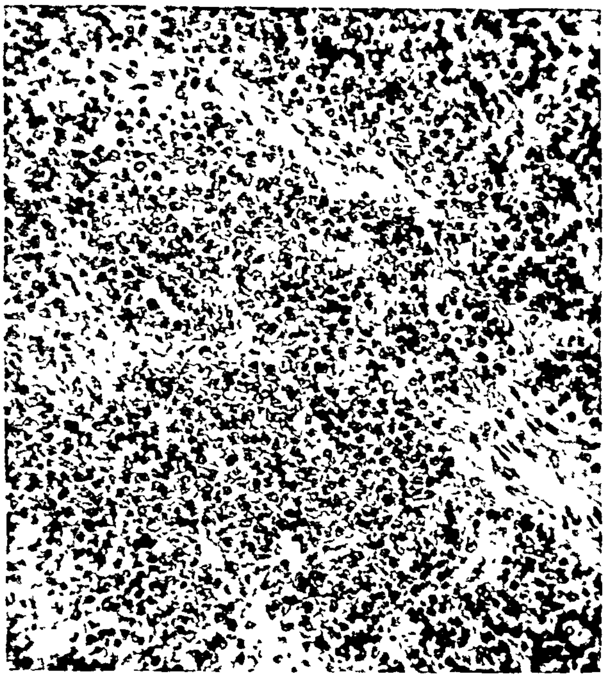

Fig. 5. Case B. M. Note the rosette arrangement of the cells characteristic of a sympathoblastoma or sympathogonioma. A very malignant type. X 200.

tuted ambulation the day after operation. She was unable to bear weight on her legs. The Achilles reflexes were hyperactive. Ankle clonus was present and the Babinski was absent. There was good motor power and no gross disturbance of sensation was present. On Dec. 15, 1946, paraplegia was complete. Flexion of the feet was extremely painful. There was marked disturbance of sensation. On Dec. 23, 1946, under sodium pentothal anesthesia, a laminectomy was performed on T 1, 2 and 3, and a longitudinal extradural firm tumor mass was removed by Dr. Michael Scott. Part of the tumor projected through the foramen between T 2 and 3 (Fig. 4). This was curetted and cauterized. The pressure of the tumor had already caused some destruction of the cord which looked normal above and below the tumor. At the site of the tumor, however, the cord looked like a pinkish homogenous mass. The pathologic report of Dec. 12, 1946, by Dr. Helen Ingelby read as follows: Frozen section revealed a malignant tumor, either sympathoblastoma or lymphosarcoma. "The tumor is extremely vascular and presents numerous hemorrhages. The tumor cells somewhat resemble immature lymphocytes. They show a marked tendency to be arranged in

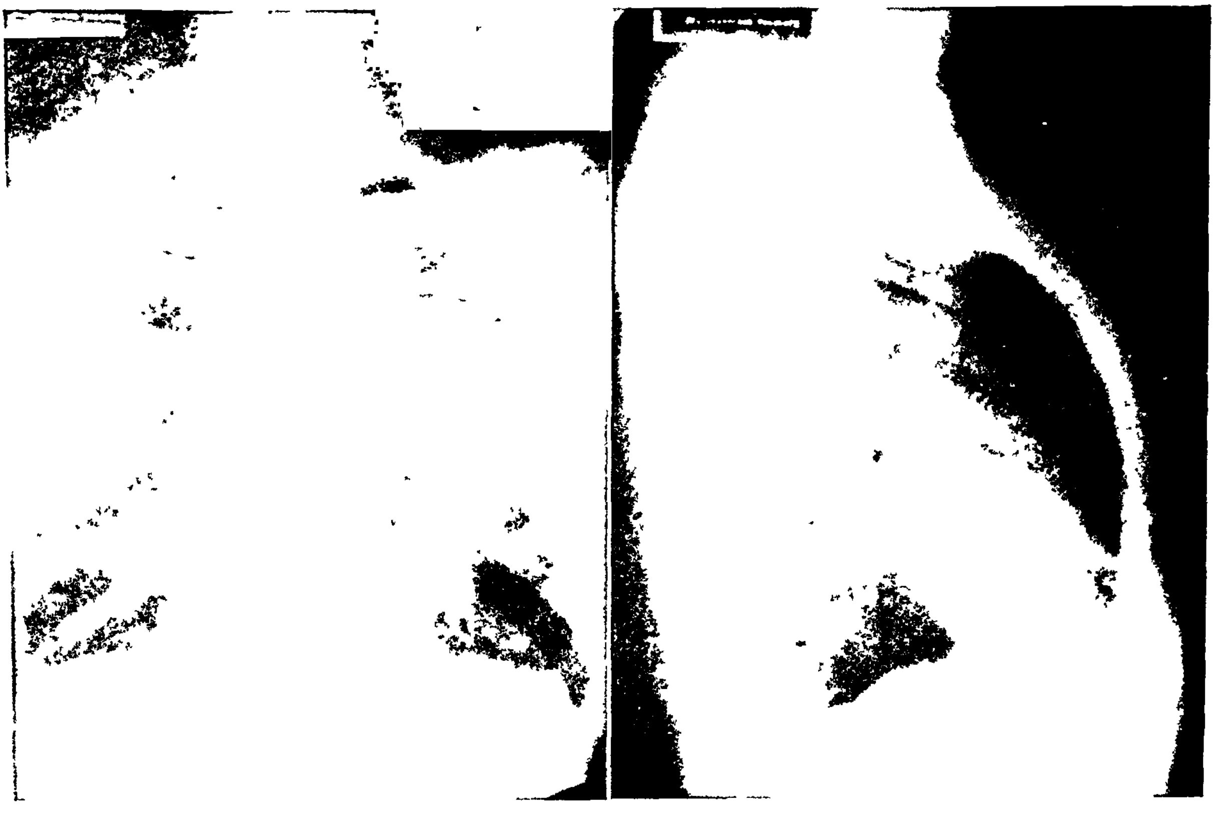

Fig. 6. Case F. V. Cyst of the left lung.

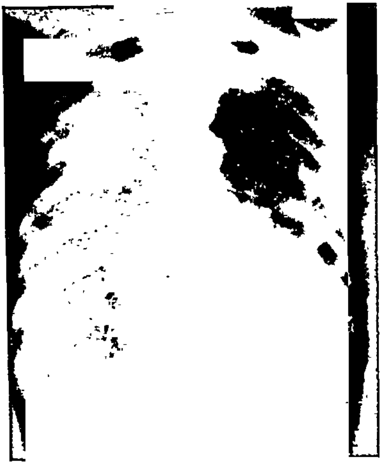

Fig. 7. Case W. S. Massive bilateral cysts of the lung.

Fig. 8. Case I. W. Fibrolipochondroma of the lung. The mass just above the center of the lung is the tumor.

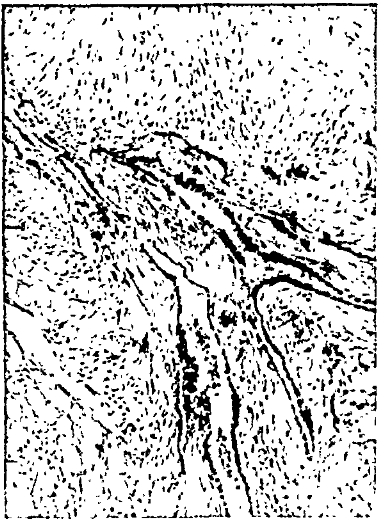

Fig. 9. Case I. W. Fibrolipochondroma. Section shows fibromatous and lipomatous elements with marked distortion of bronchi of lung. X 100.

rosettes. This is highly characteristic of malignant sympathetic cell tumor. This tumor is a sympathogonioma, i.e., a sympathoblastoma in its undifferentiated stage. It consists entirely of round cells arranged more or less in rosettes. The more mature spindle cells and large nervelike cells have not been found in any of the sections examined. A point in favor of this diagnosis is that they occur in young persons. They are very highly malignant." (Fig. 5.)

Comment. In this case a dumb-bell tumor of the mediastinum and spinal canal existed for a number of years. No symptoms of paraplegia occurred until five days after the operation on the tumor in the mediastinum. After removal of the tumor of the mediastinum apparently the portion in contact with the cord was free to cause pressure upon this structure. At the present time she walks with a spastic gait. Sensation has returned almost completely. There has been recovery from paralysis of the bladder and rectum, with complete control. The outlook for restoration of function of the legs is good.

CYSTS OF THE LUNG

Unilateral cysts are not as innocuous as they may appear. Some may undergo degeneration and even become malignant. Single cysts of the lung usually cause cough, and blood-streaked sputum may accompany the cough. Single cysts are resectable, which usually means that a lobectomy must be performed. As an example of a single cyst occupying the upper lobe of the left lung, I would like to submit the following.

Case 4. F. V. Male. Age 29. He consulted us on Feb. 5, 1947 with a history that he spat up blood as a result of coughing. He also had pain in the chest (Fig. 6). Curiously enough, this patient was a glass blower in whom cysts of the lung are a common occupational hazard. It happened in this instance that he never used his lungs for blowing glass. Instead, all glass receptacles were fashioned with an automatic glass blower.

Massive bilateral cysts of the lung are not common (Fig. 7). Symptoms in these cases are cough, expectoration, and in some cases, a constant desire to cough without the production of sputum. Spontaneous pneumothorax as a result of rupture of a cyst is a rather common occurrence. Obviously surgery cannot be employed in these patients unless the disease is confined to a single lobe on each side. Otherwise, the condition is in the same category as bilateral cysts of the kidney.

BENIGN TUMORS OF THE LUNG

While a great majority of lung tumors are malignant, some are found to be benign. There is still considerable controversy over the adenomas of the bronchus. These are rather common growths of the major bronchi and are found most frequently in young females. We believe that it is far safer to treat such adenomas by pulmonary resection than by local bronchoscopic removal. Cases have been reported which appeared to be typical bronchial adenomas, but which subsequently developed carcinoma of the lung with metastases. Another type of benign tumor of the lung is the fibrochondroma, also called hamartoma by Harrington. Such a case is illustrated by the following.

Case 5. I. W. Age 64. Patient was admitted to the Mount Sinai Hospital on July 16, 1946, and discharged on Oct. 10, 1946. This case was referred by Dr. Theodore H. Mendell. Since 1940 this patient has been coming to the Outpatient Department for symptoms referable to the gastrointestinal tract. She was a known hypertensive with a palpable thyroid gland, was very obese, with a B.M.R. of minus 8. There were no symptoms referable to the chest. On June 14, 1946, by means of an x-ray a large dense well circumscribed shadow was noticed in the lower portion of the left lobe. The urine showed traces of albumin. Sp. gr. 1013–25, blood sugar 89, urea nitrogen 17, hemoglobin 12.7, white blood cells 10,500, polymorphonuclears seg. 55, nonsegmented 5, lymphocytes 29, monocytes 4, eosinophils 8. On Aug. 26, 1946, she was seen in consultation by one of us (M. B.). On Aug. 30, 1946, a left total pneumonectomy was performed. With the exception of aspiration of a small amount of fluid following operation, the convalescence was uneventful. Blood pressure at this time was 190/100 mm. Hg. Pathologic diagnosis was benign fibrolipochondroma of the lung (Figs. 8 and 9).

Comment. This patient had been treated for five or six years for gastrointestinal symptoms. She never had any trouble referable to her lungs. A tumor in the lung was revealed accidentally as a result of a routine x-ray study. I refused to operate upon her because her general condition was poor. The internist insisted, however, that operation was her only chance to get well and after much persuasion I consented to perform a total pneumonectomy. The patient after operation had no untoward symptoms. She made a brilliant recovery and is still in good health.

A third type of benign tumor of the lung is the cylindroma of the bronchus which resembles adenoma of the bronchus, but microscopically has many of the characteristics of mixed cell tumor of the parotid gland. While they do not metastasize, these tumors produce symptoms by local invasion.

We feel that benign tumors of the lung should be resected as discovered. There is always some doubt as to the true diagnosis until the tumor is removed. By allowing such tumors to remain, one runs the risk that they may undergo malignant change. Finally, a benign tumor may produce serious consequences, such as bronchiectasis and lung abscess, as it grows and compresses major bronchi.

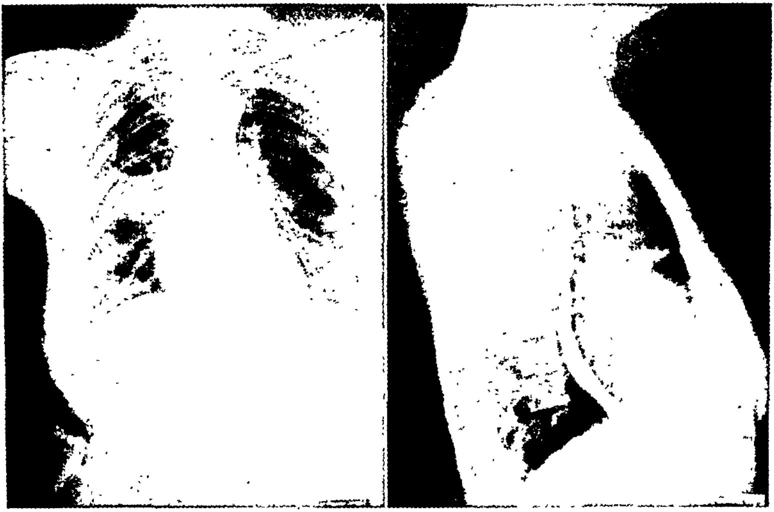

Fig. 10. Case G. G. Bronchogenic carcinoma of the right lung.

CARCINOMA OF THE LUNG

The cause of carcinoma of the lung is unknown. Heavy smoking, irritation from the fumes of coal tar products and exhaust gases from automobiles have all been mentioned as contributing factors. Carcinoma of the lung may affect any age. Men are more susceptible than women. One should always be cancer conscious in treating symptoms referable to the thorax or abdomen. One should be especially suspicious of the history of the patient who has a nonproductive cough of recent origin. Blood-streaked sputum should always be looked upon with grave suspicion of a malignancy. This was the invariable history in every case but one of those with carcinoma of the lung upon whom we operated. Repeated attacks of pneumonitis, unresolved pneumonia and lung abscess frequently are caused by an underlying malignant process primary in the lung.

Selection of Cases for Operation. Many of the early cases were poor risks for operation, and as a result the mortality was higher than it should have been. Nevertheless, the mistakes made in the formative period have resulted in a more careful selection of patients for operation. Those with a bloody effusion in the pleural cavity are inoperable cases. The decision whether a pneumonectomy is possible or not must often be determined at the time of operation. Inoperable cases may be those in which many glands are involved, cases with extensive abscess formation, and those in which the recurrent laryngeal nerves are involved. The accidental discovery of cancer of the lung in a routine examination is illustrated by the following case.

Case 6. G. G. Age 56. The patient was admitted to the Jewish Hospital on Nov. 24, 1946, and discharged on Jan. 5, 1947. This patient was referred by Dr. Raymond Katzen. Her chief complaint on admission was expectoration of blood-streaked sputum, weakness and lassitude. She complained of dyspnea and palpitation on slight exertion, accompanied by ankle edema, cough, and precordial pain. Examination of the chest showed no limitation of expansion. The roentgenogram suggested a possible bronchogenic carcinoma (Fig. 10). The urine showed no abnormalities and the

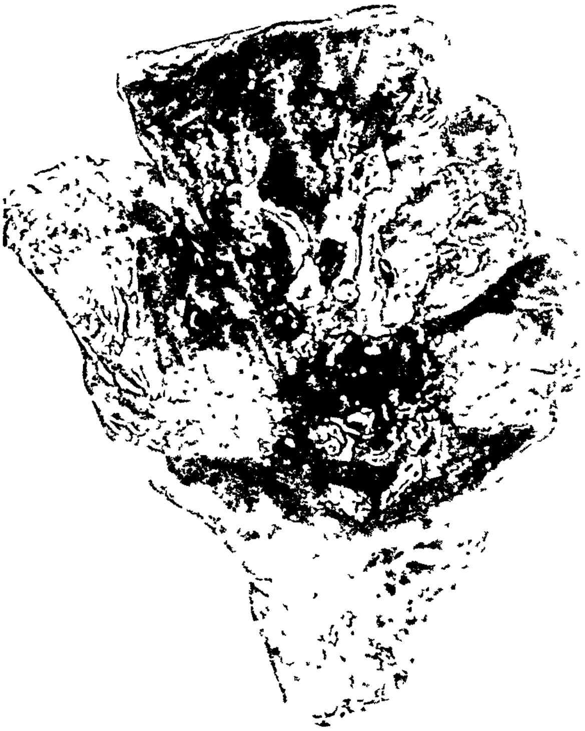

Fig. 11. Case G. G. Bisected lung showing a bronchogenic carcinoma.

blood count was normal. Bronchoscopy was negative. A specimen of secretion taken for cell-block revealed endobronchial evidence of carcinoma. On Dec. 3, 1946, a total pneumonectomy of the right lung was performed (Fig. 11). The vessels and the bronchi were isolated and ligated individually. Penicillin, 100,000 units, was placed in the pleural cavity. The chest was closed without drainage. The pathologic diagnosis was bronchogenic carcinoma.

Comment. A woman, 56 years of age, with symptoms of persistent cough and blood-streaked sputum was successfully operated upon and the right lung removed in its entirety. She had a smooth convalescence. Very little fluid was obtained upon thoracocentesis. Ten days after operation and for a few days following, aspiration was performed and very small quantities of fluid were obtained. Each time, however, 100,000 units of penicillin were injected through the same needle. In addition, 100,000 units of streptomycin were administered for a few days to combat a mild infection which did not respond to penicillin. About a week before her discharge a small rubber tube was inserted

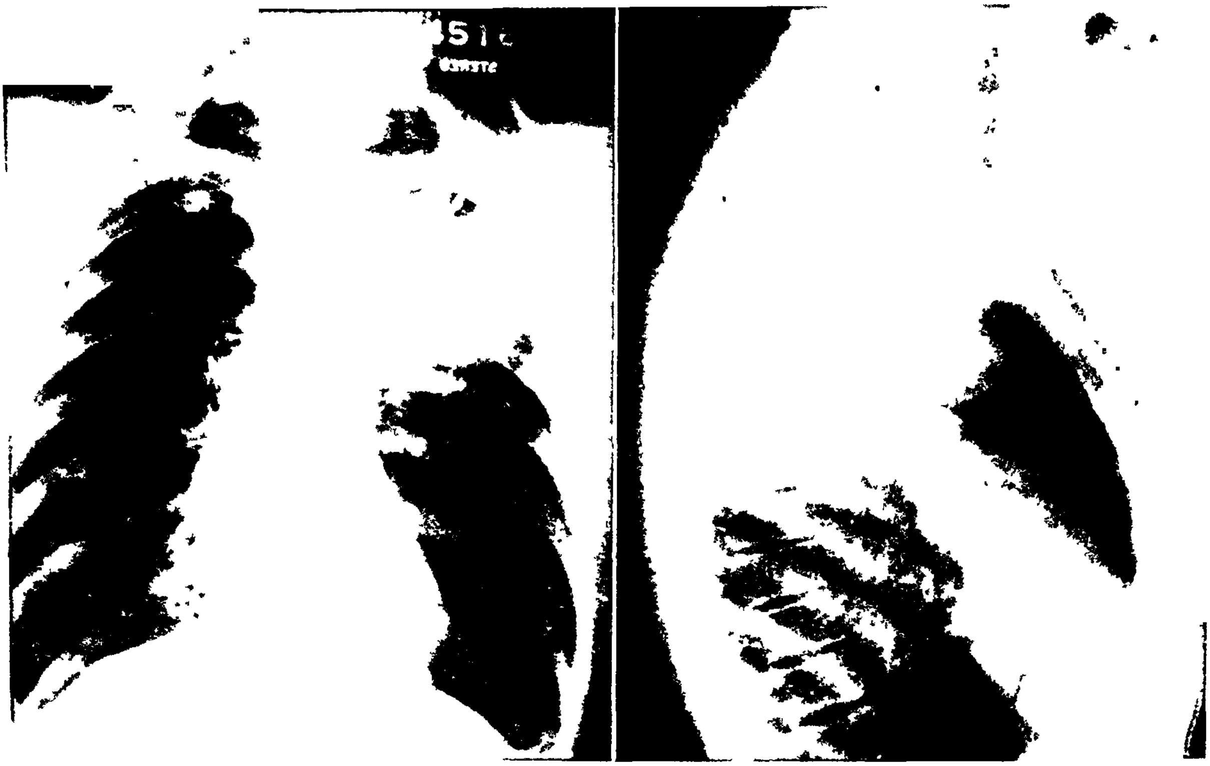

Fig. 12. Case P. M. Y. Bronchogenic carcinoma in left upper lung.

to prevent the accumulation of pleural fluid. This tube was removed two days before discharge to her home.

The following patient illustrates the necessity for x-ray examination when a dry, hacking, nonproductive cough without blood-streaked sputum is present. The history is as follows.

Case 7. P. M. Y. Male. Age 56. Patient was admitted to the Jewish Hospital on October 3, 1945 and discharged on Nov. 14, 1945. This case was referred by Dr. Ford M. Summerville of Oil City, Pennsylvania. The patient was apparently well until two months ago when he complained of a dry, hacking, nonproductive cough. There was never any blood in the sputum. He lost 10 to 15 pounds of weight in spite of a good appetite. Examination of his chest revealed no abnormalities. The bronchoscopic examination performed on Oct. 8, 1945, was entirely negative for carcinoma. X-ray examination revealed a carcinoma in the left upper lobe, bronchogenic in character (Fig. 12). On Oct. 11, 1945, a left total pneumonectomy was performed Convalescence was rather stormy. Four days after operation 400 cc. of fluid was aspirated. Aspirations were performed for 10 days following operation, after which no fluid was obtained. He was out of bed and walking on the first of Nov. 1945. Laboratory reports show

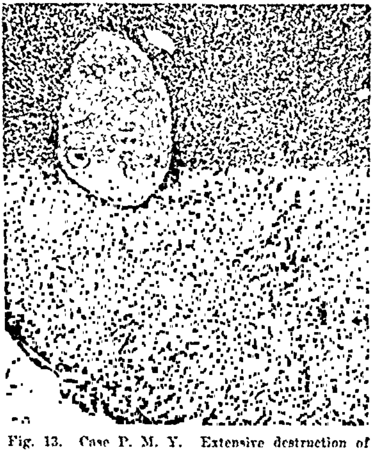

Fig. 13. Case P. M. Y. Extensive destruction of bronchus by growth. X 50.

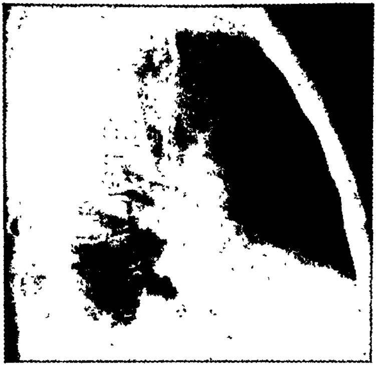

Fig. 14. Case E. B. X-ray reveals lower lobe segmental atelectasis due to bronchogenic carcinoma.

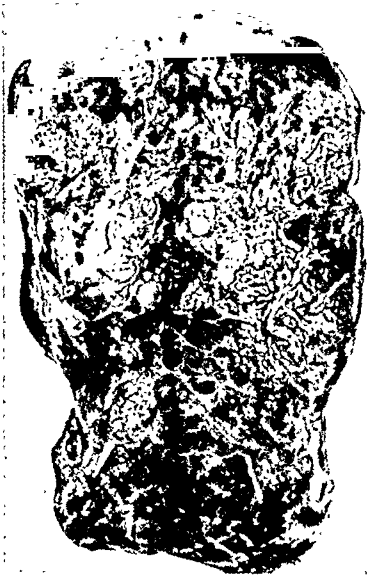

Fig. 15. Case E. B. Specimen illustrates a completely infiltrated lung with a tumor. An additional pneumonic process is present.

that the urine was negative. Blood examination showed hemoglobin 13.6, red blood cells, 4,580,000, white blood cells, 24,500, polymorphonuclears 84, glucose 82, blood urea 12. Microscopic examination revealed that part of the bronchus has been destroyed by a cancerous growth. The latter has destroyed the surrounding lung tissue.

Comment. This patient apparently complained only of nonproductive cough two months before admission to the hospital. This is a rather unusual occurrence because there is apt to be a longer history of persistent cough with blood-streaked sputum. Such an occurrence should always put one on his guard to consider possible cancer of the lung. The patient left the hospital and went to his home town. Eight months after operation the patient developed a hemiplegia and died several weeks after this occurrence. No necropsy was performed.

Suspicion of carcinoma of the lung in the following case was due to the fact that the patient's sputum was blood streaked. The history is as follows.

Case 8. E. B. Male. Age 62. The patient was admitted to the Jewish Hospital on Jan. 2, and discharged on Jan. 24, 1947. He was referred to us by Dr. Bernard G. Slipakoff. Apparently there were no symptoms referable to the chest. He was well until December, 1945, when he had an attack of pneumonia. He was in bed for several weeks during which time he had chills, fever and pain in the left chest. He had another attack of pneumonia in the summer of 1946. He never regained his health, his main complaint being cough and expectoration. The sputum was blood streaked. He lost 30 pounds in weight. On admission the patient had good color, but showed some emaciation. Clubbed fingers and cyanosis were present. The bronchoscope revealed carcinoma of the lung. Urine showed no abnormalities. Complete blood count showed hemoglobin 12.9, red blood cells, 5,100,000, white blood cells, 17,250, polymorphonuclears, 86, mononuclears, 2, lymphocytes, 11, eosinophils 1, filamentals 89, nonfilamentals 11, glucose 94, urea nitrogen 12.7. X-ray examination reveals lower lobe segmental atelectasis due to bronchogenic carcinoma (Fig. 14).

On Jan. 11, 1947, under endotracheal anesthesia, a total left pneumonectomy was performed by one of us (A. B.). With the patient lying on the unaffected side, a posterolateral incision was made. The eighth rib was removed and all the ribs from the third to the seventh were incised at the transverse process. Pathologic examination showed the main tumor included the wall of the bronchus. The hilum of the left lung was completely infiltrated with a tumor extending into the adjacent lung around the inferior branch of the main stem bronchus for a distance of 3 cm. The entire lower lobe is consolidated with a pneumonic process. The diagnosis was bronchogenic carcinoma, squamous cell type, with metastasis to the pericardium (Fig. 15).

After daily aspiration of small quantities of fluid from the operated side, 100,000 units of penicillin were injected into the thoracic cavity. His convalescence was uneventful. The morning following the operation he dangled, and in the afternoon he walked to the bathroom.

Comment. After two attacks of pneumonia, one in 1945 and the other in 1946, the patient never regained his former health. Cough continued with blood-streaked expectoration. Here again there were no symptoms referable to a malignant tumor of the chest, except the suspicious sputum. He had lost weight, however, to the extent of 30 pounds. A total pneumonectomy was performed. At this time it was noticed that there was an extension of the disease to the pericardium. This patient had an unusual convalescence. He dangled the day after operation and 24 hours postoperative he walked to the bathroom. He imposed early ambulation upon himself because he would not use the bed pan. He spent very little time in bed during his convalescence. He was discharged from the hospital 13 days after operation.

SUMMARY

1. Benign and malignant tumors of the mediastinum, pleura and lungs have been reviewed.
2. The prospects of a cure in malignant growths affecting children is practically hopeless.
3. Sarcoma is the prevalent tumor in children and in those near puberty.
4. Tumors, primarily benign, affecting the lung may become malignant. Therefore, they should be removed by segmental resection or pneumonectomy.
5. The incidence of carcinoma of the lung has increased. It behooves all physicians to be cancer conscious when confronted by a

patient with a persistent cough with or without blood-streaked sputum. In cancer of the lung the best results are obtained after early operation.

SOMMAIRE

Les tumeurs bénignes et malignes du médiatin, de la plèvre et des poumons sont passées en revue. Il y a peu d'espoir de guérison dans les tumeurs malignes attaquant les enfants. Le sarcome est la tumeur la plus fréquente chez l'enfant et chez ceux qui approchent de la puberté. Les tumeurs pulmonaires primitivement prononcées benignes peuvent devenir malignes. Elles doivent être enlevées par résection et par pneumonectomie. La fréquence des carcinomes du poumon a augmenté. Tout médecin confronté par un malade qui a une toux persistante accompagnée ou non de crachats sanguins doit penser au cancer. Dans les cancers du poumon les opérations précoces donnent les meilleurs résultats.

SUMARIO

Se ha presentado una revista de los tumores del mediastino pleura y pulmones. La posibilidad de la curacion de los tumores malignos de esta region en las criaturas es muy pequena. El sarcoma es el tumor mas prevalente hasta la edad de la pubertad. Por razon de que los tumores benignos primarios del pulmon pueden convertirse en malignos es importante su reseccion segmental combinada con la neumonectomia. Por cuanto la incidencia del cancer del pulmon esta aumentando es el deber de todo medico el sospechar la presencia del cancer en todos los casos de toz persistente. La cirujia de mejores resultados en los casos deo comienzo reciente.

RIASSUNTO

Rassegna dei tumori benigni e maligni del mediastino, della pleura e del polmoni. La prognosi nei tumori maligni dei fanciulli e' assolutamente infausta. A quest'eta' i tumori piu' comuni sono i sarcomi.

I tumori benigni dei polmoni possono—con una certa frequenza—trasformarsi in tumori maligni. Vanno quindi asportati mediante resezione segmentaria e pneumonectomia. La frequenza dei carcinomi sembra essere aumentata in questi ultimi tempi. I medici dovrebbero tenere percio' ben presente quest' evenienza negli ammalati con tossi persistenti, anche se lo sputo non fosse colorato di sangue. Un precoce intervento operativo e' la cura migliore.

Nonfatal Bile Peritonitis Due to Common Duct Injury (Slow Leak)*

HARRY C. SALTZSTEIN, M.D., AND VERNON B. BLAHA, M.D.
DETROIT, MICHIGAN

BILE peritonitis is the peritoneal reaction caused by variable amounts of free bile within the peritoneal cavity.[1] It is known chiefly as an alarming clinical condition characterized by shock and high mortality following leakage of bile into the peritoneal cavity subsequent to biliary surgery. Undoubtedly, the postoperative occurrence would be much more common were it not for the common practice of most surgeons of instituting drainage following all types of biliary surgery, as well as for the fact that bile is secreted at a very low pressure.

Choleperitoneum at times may develop more slowly following external abdominal trauma with resultant injury to the liver or bile ducts. In the majority of these cases the formation of ascites dilutes the bile to such a degree that a milder clinical course ensues. That such a milder and slower sequence may also follow surgical trauma to the bile ducts does not seem to be so definitely noted in the literature.

The following case describes such an occurrence.

Mrs. B. W., age 57, was admitted to Harper Hospital on July 5, 1947, referred by Dr. S. G. Meyers.

There was a history of biliary dyspepsia and biliary colic for 14 months. There had been no history of chills, fever, jaundice or acholic stools. Cholecystograms had revealed a nonfunctioning gallbladder. Cholecystectomy and appendectomy were performed in another institution on June 5, 1947. There had been troublesome bleeding during the cholecystectomy. The postoperative course was uneventful until the fourth postoperative day, when she developed jaundice, acholic stools and dark urine. Temperature elevation was only moderate. The jaundice increased, but on the seventh postoperative day, it lessened. The acholic stools persisted. There was no rigidity and no abdominal pain other than the usual postoperative discomfort. There was no further elevation of temperature or increased pulse rate and no vomiting or evidence of shock. The abdominal drain was removed on the eighth postoperative day. The biliary drainage was not excessive either before or after removal of the drain. The drainage stopped completely on the ninth postoperative day. Abdominal distention was first noticed on the tenth postoperative day. The abdomen progressively increased in size and after another ten days there was increasing respiratory difficulty, loss of appetite, and weakness. The jaundice remained mild with clay-colored stools and dark urine. There was some generalized pruritis.

The patient was transferred to Harper Hospital on July 5, 1947, one month after her cholecystectomy. The presenting symptoms were fulness of the abdomen, loss of appetite and difficulty in breathing. The temperature was 98° F. orally, pulse 100, respirations 26, and blood pressure 130/90. The general appearance was that of an obese white female with moderate abdominal and respiratory distress. There was a slight generalized icterus. Physical examination of the chest revealed bilateral basilar atelectasis. There was no evidence of cardiac pathology. The abdomen was markedly distended with mild generalized tenderness. A fluid wave and shifting dulness were present. The patient complained only of abdominal fulness. There was no abdominal pain. A one plus pitting edema was present over the sacrum and lower extremities.

Laboratory Findings. Hemoglobin, 11.5 Gm. or 73 per cent, red blood cells 3,600,000, white blood cells 7,950, with a normal differential. Urine was amber, Sp. Gr. 1.020. Bile foam test was positive. Icterus index, 38; Vandenberg biphasic; NPN 38; serum chlorides 532, total proteins 5.81; AG ratio 2.1/1; prothrombin 85 per cent of normal; cholesterol 135 mg.; cholesterol esters 53 per cent of total cholesterol. Alkaline phosphatase 3.1 units. Thymol turbidity 6 units. Urobilinogen negative. Stools were clay colored and consistently negative for bile.

Clinically, there was a large amount of ascites causing distress, mild icterus and acholic stools. After brief hospital observation abdominal paracentesis was done on July 7, 1947, and 11,000 cc. of green turbid fluid obtained. Relief of abdominal and respiratory discomfort was immediate. The ascites recurred, however, and in three days a second paracentesis had to be done, 2,500 cc. being obtained. The fluid had a specific gravity of 1.014. Bile salts were positive but the bile acids were negative. Microscopic examination disclosed one lymphocyte and two polymorphonuclear cells per high-power field. Bacterial cultures were negative.

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* From the Surgical Service of Harper Hospital.

The patient did not present the clinical history of toxic bile peritonitis as we have understood this condition. The laboratory data revealed a sterile ascitic fluid with bile salts present but no bile acids. In view of the recent cholecystectomy, followed by the sudden appearance of jaundice, which receded, and the formation of ascites, the most probable diagnosis was that of a constant intraperitoneal biliary leakage secondary to surgical trauma, with a well tolerated choleperitoneum and increasing ascites. The possibility of inflammation or new growth at the porta hepatis, causing common duct and portal vein obstruction by extrinsic pressure, was not excluded. Accordingly, the patient was prepared for surgery with high vitamin, high protein, high caloric diet, parenteral amino acids and blood transfusions plus extensive vitamin K therapy.

Operation. Celiotomy was performed on July 16, 1947. There were fully 3,000 to 4,000 cc. of bile-stained fluid in the peritoneal cavity. The gallbladder bed was well healed. The common duct region was exposed. The proximal portion of the common duct was identified and found collapsed. A 1-inch cystic duct stump was present from which there was no evidence of biliary leakage. Approximately 0.5 cm. above the junction of the cystic and common hepatic ducts a large swollen catgut ligature was found encircling the common hepatic duct. Biliary leakage was apparent at this site. After removal of the encircling ligature, the common duct was incised distal to the cystic duct. A probe passed downward easily into the duodenum and upward into the liver, through the ligatured area, thus establishing the continuity of the common duct. A T-tube was inserted into the common duct the proximal limb of the T-tube well above the stricture site. Irrigation of the T-tube with saline now revealed a small 1-mm. perforation of the common hepatic duct on the under-surface at the site of the previous encircling ligature. This was repaired with one silk suture and then biliary drainage was obtained from the T-tube. The abdominal wall was closed in layers with intraperitoneal drainage.

One could now reconstruct the sequence of events: the occluding ligature had necrosed on the seventh postoperative day, but the perforation was so minute that the peritoneal cavity had had time to counteract the toxicity of the bile leakage by a painlessly developing ascites, even though there was no external drainage.

Following the common duct repair the patient's postoperative course was uneventful and afebrile. Clamping of the T-tube was started on the fifth postoperative day. Bile appeared in the stool on the seventh postoperative day. The icterus index on July 25, 1947, nine days postoperative, was 19 units. Cholangeogram on the twelfth postoperative day revealed no evidence of obstruction to the common duct, hepatic radicles, or the ampulla of Vater. There was no evidence of intraabdominal leakage of opaque media. At the time of discharge, 16 days postoperatively, the patient tolerated clamping of the T-tube 12 hours daily.

Subsequent postoperative examinations have revealed a consistent gain in weight and strength. On Sept. 9, 1947, the icterus index was 10 units. The T-tube was removed on Oct. 7, 1947, approximately three months postoperatively. Drainage ceased within the next 24 hours.

The patient experienced no difficulty for three months. In the latter part of January, 1948, she developed a slowly progressive icterus with somewhat acholic stools. Exploration on Feb. 17, 1948, revealed a stricture of the common duct 1.5 cm. below the hilum of the liver. The stricture was resected and since the ends were easily brought together, an end-to-end anastomosis was done. A T-tube was inserted 1.5 cm. distal to the anastomoses with the upper limb extending through the anastomotic site. At the time of her last examination, on April 10, 1948, there were no symptoms of cholangitis, her icterus had almost completely cleared, and stools were of normal color. The T-tube is being clamped 20 hours daily without discomfort or biliary drainage.

BILE PERITONITIS

McLaughlin,[1] reporting 8 cases of bile peritonitis in 1942, commented on the paucity of reports of clinical aspects of this condition in American and British literature.

Etiology. A number of causes are indicted.

1. Perforation of a gangrenous gallbladder tends to be walled off and become localized, and hence accounts for only a very occasional case of bile peritonitis. Nevertheless, perforation into the general peritoneal cavity with generalized peritonitis does occur. In the series of 64 cases of perforation of gangrenous gallbladder reported by Allen and Wallace,[2] 3 caused generalized peritonitis, all of them fatal.

2. A number of cases of bile peritonitis

without rupture of the biliary tree have been reported. Reviewing the more recent reports, McLaughlin states that "a small perforation, often microscopic in size, could be demonstrated in the majority of instances."

3. Accessory hepatic ducts entering the gallbladder directly from the liver bed may cause leakage after cholecystectomy done without drainage.

4. Slipping of the cystic duct ligature or closure of the common duct without drainage likewise have caused bile peritonitis. An overlooked common duct stone or other obstruction at the papilla of Vater may "blow out" the cystic stump ligature or the common duct suturing, or even rupture an intrahepatic bile radicle. A poorly placed drain (not in Morrison's pouch) or a nonfunctioning common duct tube may retain an intraabdominal collection of bile which can become alarming and dangerous (or fatal) within 24 to 48 hours. So much so, that Allen[3] recommends being certain that the common duct tube is draining bile before the operation is completed, if necessary taking the patient back to the operating room the same day to correct it. Of all of the above causes, McLaughlin thought that overlooked stones in the common duct causing increased biliary tree pressure was the most frequent cause of bile peritonitis.

5 and 6. The two other causes of bile peritonitis are stricture of the common duct from operative trauma, and rupture of the liver or extrahepatic biliary system either by intraabdominal injury (i.e., stab wound or gunshot wound) or extraabdominal injury from a blow or fall.

Pathologic Physiology. Considerable experimental work has been done on bile peritonitis. Bile is an irritant, its salts injuring the capillary walls, causing permeability and out-flowing of plasma. "A few cubic centimeters of concentrated bile free in the peritoneal cavity cause a transudate of several hundred cubic centimeters of fluids."[4]

Manson and Eginton[5] thought that the specific toxic action of the bile was the most important factor and the shock due to fluid loss from the vascular system was second in importance.

Sterile bile may be well tolerated, but infected bile may be "extremely dangerous." Many of the fatal cases have had infected bile. Although the role ascribed to *Clostridium welchii* and other organisms in choleperitoneum is variously interpreted, most authors agree with Mentzer[6] that the outpouring of plasma and tissue fluid, plus the fact that bile is a good culture medium, are sufficient reasons for the apparent increase in the virulence when infection is added.

Clinical Symptoms. The classical picture of bile peritonitis is shock, which usually develops within 24 to 48 hours. The pulse rises rapidly to 160 to 170. Some cases show no distention, fever, or pain; others show all the classical signs of surgical shock, with pain, cyanosis, circulatory failure and collapse. They may prove fatal within a very few hours. One of McLaughlin's cases expired 2 hours after admission, with the diagnosis of coronary thrombosis. Necropsy revealed 1,000 cc. of free bile in the abdominal cavity with a gangrenous gallbladder. Sometimes pain is so severe that peptic ulcer is simulated; or if not so sharply acute, the clinical picture resembles ruptured appendicitis, intestinal obstruction, etc. The condition is serious, the mortality in 2 series being 60 per cent. Immediate abdominal drainage is required. Eliot[7] mentioned 2 cases in which failure of proper drainage resulted in an accumulation in the lesser peritoneal cavity and fatal outcome. Graham[8] in the discussion of Eliot's paper, mentioned a case in which, following cholecystectomy, there was no drainage for 48 hours, then chills, fever, severe pain and jaundice began. The tube was removed with "evacuation of a large amount of bile which relieved the situation, but a stricture developed later. There had been puddling of retained bile along the lateral margin of the liver."

Walters[9] describes a case in which, following repair of a stricture of the common duct, bile leaked and accumulated above the dome of the liver, displacing it and causing shock. Opening the abdominal incision released this, and recovery was immediate.

The irritant action of the bile salts causes dense adhesions. If the stage of acute shock is surmounted, there is a great tendency for the bile to collect in a portion of the abdominal cavity and become encysted.[10] Subdiaphragmatic collections of bile have been drained frequently, with relief and recovery. Bile is secreted at low pressure. A lateral opening in the common duct, although allowing the escape of bile, will tend to close and the bile finds its way into the duodenum, provided there is no obstruction below the opening.[11]

If the patient survives the acute leakage and the bile does not become encysted, a more chronic stage ensues, which sometimes must be differentiated from ascites. There is general abdominal distention, with only the moderate discomfort caused by fluid accumulation.

Common Duct Injury. The usual history of common duct injury is somewhat as follows: there is bleeding at the time of operation, which has been controlled in a more or less hurried fashion. If the common duct has been completely ligated, jaundice develops within 3 to 4 days. More frequently, the discharge of bile is prolonged for an unwarranted time (several weeks or 2 to 3 months), and then jaundice ensues. It is intermittent if the common duct is only narrowed and allows the passage of thin normal bile (but not inspissated bile of cholangitis attacks); it is complete and the icterus is intense if the stricture fibroses later and occludes the entire lumen.

We have searched through many of the case reports in the large number of recent articles on common duct injury, and have found very few observations that a leak in the common duct or biliary system would, after operation, cause jaundice, and then a large intraabdominal collection of fluid which did not localize, yet did not cause acute symptoms. Except for the following case reported by Muller[12] in 1929, all of the recorded cases of postoperative biliary leakage that we could find have caused startling and acute symptoms, such as those described above.

Muller's case was as follows: "The patient was operated upon elsewhere in October, 1928, and a cholecystectomy performed. The drain was removed in four days but the patient returned after discharge complaining of abdominal distention, and a paracentesis removed several quarts of bile-stained ascitic fluid. This was repeated in December, and the patient again submitted to operation, at which time nothing was found except some bile with a good many adhesions. This patient was referred to the author on December 31 with a biliary fistula, but a few days later this stopped discharging and he made an uninterrupted recovery with rapid gain in weight and strength. Evidently, at the first operation the stump of the cystic duct leaked and the unchanged bile slowly flooded the peritoneal cavity, giving rise to no symptoms except the peritoneal reaction to exudate. There was no admixture here of blood from the liver or of other elements from the wounds which might have activated the bile into an irritating substance." Undoubtedly there have been other such cases recorded, but we did not find them.

Abdominal Injury. On the other hand, the sequence of a large intraabdominal collection of bile not proving immediately fatal is better known following abdominal trauma to the liver. Reports go back to the year 1785.[13] Presumably the so-called fracture of the liver divides only a few of the hepatic biliary radicles, and the peritoneal cavity is not immediately flooded with toxic bile.

Spivack[14] describes the condition very exactly: "The escape of bile from a ruptured liver or torn gallbladder or bile duct may result either in general or local peritonitis. There are cases reported in which several pints of bile in the abdominal cavity have been found at operation, having collected there during months without causing jaundice or signs of bile intoxication. It seems that the degree of intoxication through bile is less marked when a slow drainage of bile into the peritoneal cavity takes place. Symptoms of biliary intoxication are much more acute in cases of the rupture of the extrahepatic bile ducts of the gallbladder than in the case of the rupture of the liver." Mentzer lists several cases in which, following abdominal injury, bile varying in amounts from 8 to 15 liters, was aspirated from the abdominal cavity, usually several days after injury, and frequently repeated aspirations were done several days apart. Several of these cases recovered. Labrosse[13] described a 17-year-old youth who two years before had fallen, striking the right hypochondrium. Ten days later abdominal enlargement was noted which persisted for two years. Bile to the amount of 10 liters was found on exploration plus a small perforation of the gallbladder "which must have existed 2 years."

SUMMARY

The case reported is one of bile duct injury following cholecystectomy in which a slow leakage of bile caused gradual and fairly well tolerated abdominal ascites.

Although slowly developing bile peritonitis is well known following abdominal trauma, most of the cases which have followed operative trauma to the biliary duct system have run an acute and very toxic course with high mortality.

SOMMAIRE

L'auteur rapporte un cas de lésion du cholédoque consécutive à une cholécystectomie compliquée d'une fuite lente de la bile. Cette fuite détermina une ascite abdominale assez bien tolérée. L'étiologie de la pérétonite biliaire est discutée brièvement. Quoique se développant très lentement, la pérétonite biliaire est fréquente après les traumatismes abdominaux. La plupart des cas consécutifs à un traumatisme des voies ou conduits biliaires déterminèrent une inflammation aigüe toxique, et furent suivi de mortalité.

SUMARIO

Se reporta un caso de traumatismo del conducto biliar resultante de una colecistectomia, con escape de bilis y produciendo la ascitis abdominal. Se ha hecho una revista de la etiologia de la peritonitis biliar. Generalmente la peritonitis biliar post-operatoria presenta un curso clinico agudo muy toxico y mortalidad elevada.

RIASSUNTO

Descrive un caso di lesione dei dotti biliari successiva ad una colecistectomia, nel quale un lento deflusso della bile nella cavita' addominale ha condotto ad un graduale sviluppo di un'ascite. Discute l'etiologia delle peritoniti biliari. Lo sviluppo di una peritonite biliare, lenta nello sviluppo e con sintomi molto attenuati, e' un'osservazione poco comune. Nella maggioranza dei casi il passaggio della bile nella cavita' addominale provoca dei sintomi acuti e molto gravi, con una mortalita' elevata.

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A New and Extended Radical Operation for Carcinoma of the Uterus (Cervix and Fundus)*

HARRY KIRSCHBAUM, M.D., F.A.C.S., F.I.C.S.
DETROIT, MICHIGAN

THE extended radical operation for carcinoma of the uterus presented here offers several possibilities of extending the palliative as well as the curative potentialities of surgery in this disease.

The operation is applicable in carcinoma of the cervix Grades I and II, and in some cases of Grade III by our present standard of surgical selection.

Results of radiation in carcinoma of the uterus did not completely satisfy the expectations of radiologists and surgeons in 1924, and new developments in the sterilization of instruments, anesthesia, blood transfusions, antibiotics and chemical substances for use in combatting infection, and the Levin tube and intestinal intubation, prompted Meigs of Boston to revive interest in the Wertheim operation.

In many clinics the Wertheim procedure was never replaced by radiation therapy in operable cases. In the beginning Meigs selected minimal lesions in minimal risk patients (thin patient selection) for this form of treatment.

The new and extended radical operation for carcinoma of the uterus (cervix and fundus) can be performed in stages in the poor risk patient. It consists of (1) bilateral pelvic lymphadenectomy after Nathanson (extraperitoneal), (2) bilateral pelvic starvation ligature of Fauré (extraperitoneal), (3) radical hysterectomy of Wertheim or Schauta (intraperitoneal), and (4) presacral neurectomy (occasional) intra- or extraperitoneal. This operative procedure can be combined with cystectomy if there is bladder invasion, or it can be continued for pelvic ablation or viscerectomy if the rectum is invaded, as is being advocated by Brunschwig.

Preoperative Preparation. Low residue diet. Preoperatively, penicillin with streptomycin for 72 hours. A daily transfusion of 500 cc. of blood for two days prior to operation. Cleansing enemas and antiseptic douches; vaginal and abdominal preparation.

Anesthesia. (1) Continuous spinal catheter technic (Touhey). (2) Sodium pentothal and curare with intratracheal tube in place. (3) Continuous spinal, with drip pentothal and curare.

During operation, if desired, ureteral catheters can be kept in place with catheter in bladder attached to irrigating bottle for filling or emptying the bladder during operation.

The technic is illustrated by the accompanying illustrations, each of which carries a descriptive legend.

Postoperative Care. Levin or long intestinal tube with suction. Penicillin, 300,000 units daily. Catheter in bladder for 3 days. More experience may prove this to be unnecessary. Ambulation in 24 hours.

The duration of the first operation, with one assistant, on a thin subject, was three hours. In obese patient with longitudinal midline incision, the duration was 3 hours 10 minutes. With rehearsed team and more experience the operation could be completed in 2 to 2½ hours.

The operation is advocated in view of Nathanson's more recent work (Wertheim's and Taussig's earlier work) showing invasion of the iliac glands, and because deep therapy in many cases does not destroy the carcinoma in these glands.

With more experience it may become possible to dissect aortic glands and to ligate the ovarian vessels extraperitoneally.

The operation may be employed after cauterization or conization of the cervix as well as after radium and deep therapy; the operation may be followed by deep therapy.

There is no claim to originality in the individual procedures in this operation, but combining them in one operation offers more to the patient than the separate procedures in the surgical management of carcinoma of the uterus (cervix and fundus).

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* The illustrations in this article were exhibited at the Sixth International Assembly of the International College of Surgeons, Rome, May 16-21, 1948.

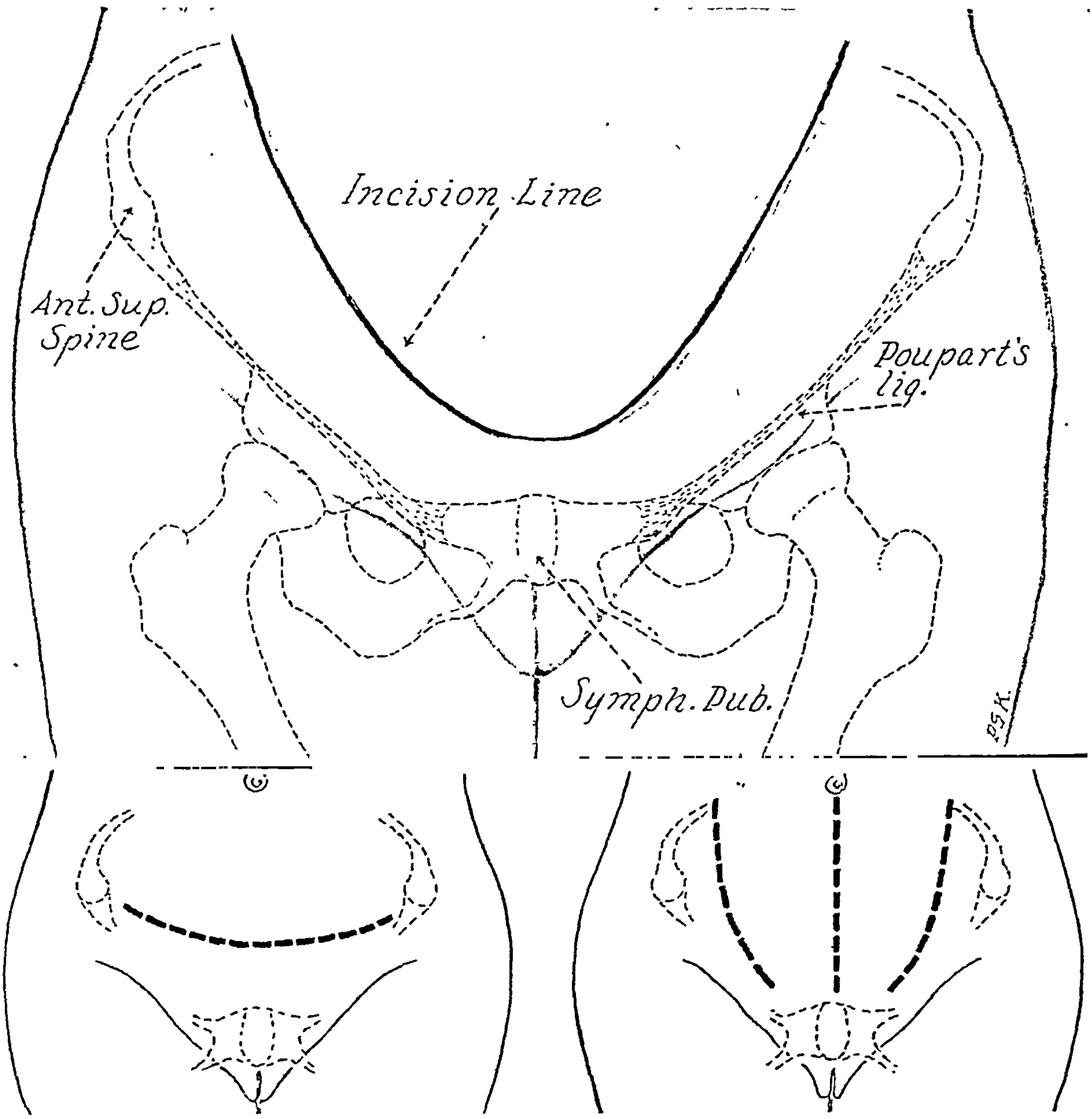
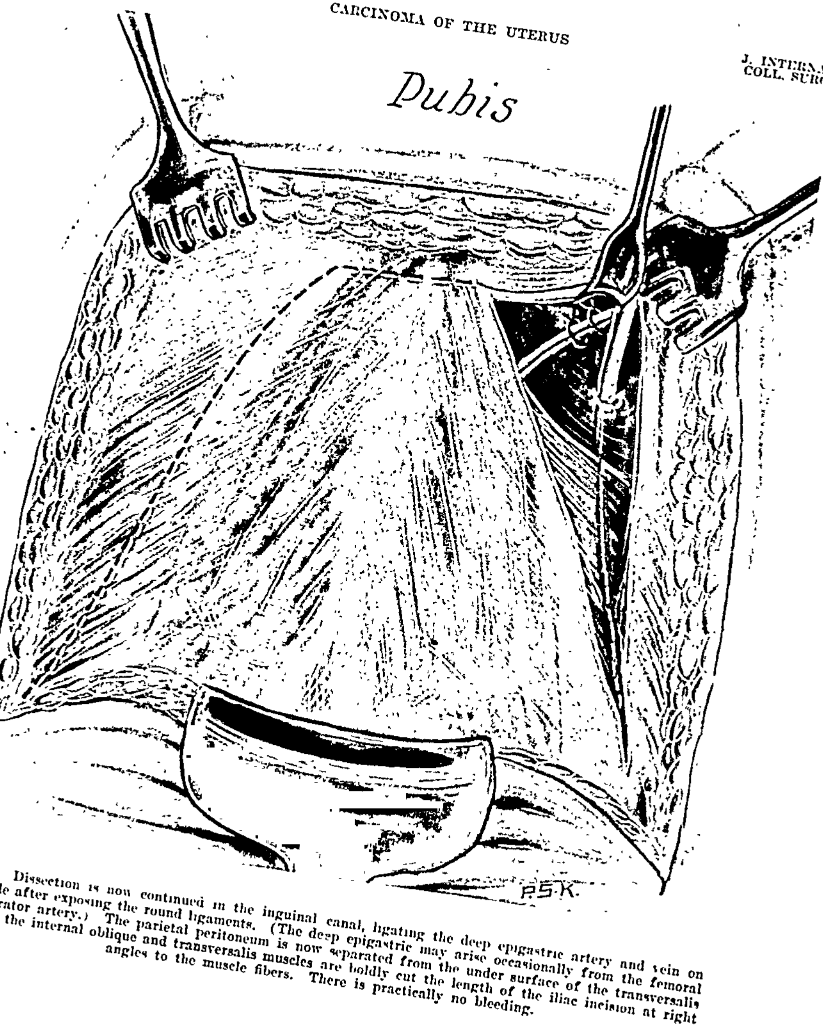


Fig. 1. The skin incision is made from 3 cm. above the level of the anterior superior spine and 2½ cm. parallel to and above Poupart's ligament. It is continued 2½ cm. above the pubis and, in the same manner, to 3 cm. above level of left anterior superior spine. The elliptical incision of the large drawing or the transverse abdominal incision in the small drawing can be used for thin women. the longitudinal incision should be used for the intraperitoneal work in the more obese patient. This is depicted in the small panel, lower left corner. The external oblique fascia is opened the entire length of incision with the usual care used in hernia operations to avoid cutting the iliohypogastric and ilioinguinal nerves. The fascia of the rectus muscles is cut transversely, exposing the pyramidalis muscle on each side. The transverse abdominal incision (lower right panel) follows the plan of the ordinary transverse abdominal incision with curving incisions toward the anterior superior spines. In the incision for the obese patient, the iliac incisions stop at the outer border of the rectus muscle on each side and the longitudinal incision is between the recti muscles.



Dissection is now continued in the inguinal canal, ligating the deep epigastric artery and vein on le after exposing the round ligaments. (The deep epigastric may arise occasionally from the femoral rator artery.) The parietal peritoneum is now separated from the under surface of the transversalis the internal oblique and transversalis muscles are boldly cut the length of the iliac incision at right angles to the muscle fibers. There is practically no bleeding.

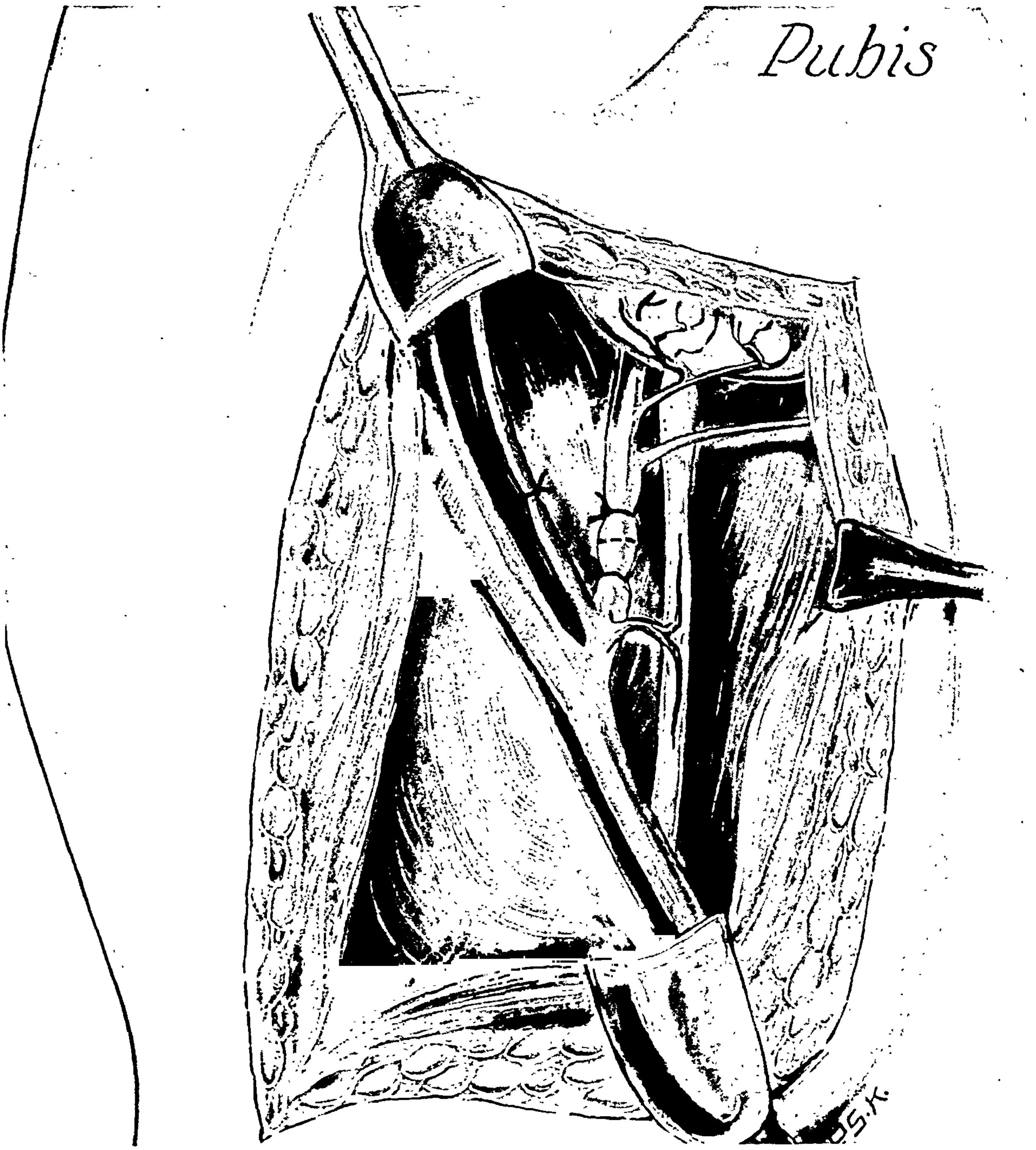


Fig. 3. The exposure of the iliac space proceeds rapidly. The left side was selected in this case for the drawing, because there was an anomaly of the origin of the left obturator (the obturator may also arise from the external iliac artery) and because it was easily possible to demonstrate a branch from the internal iliac to the ureter. On the right side the artery to the ureter was seen but was separated from the ureter by blunt dissection. As the peritoneum is separated from the iliac fossa and the pelvic brim great care should be used in the upper part of the wound because the peritoneum usually is thinner at this point. The external iliac artery soon presents to view with the very thin-walled external iliac vein behind and medial. The ureter is adherent in the peritoneum. A ureteral catheter in place may be helpful for locating the ureter. Deeper dissection brings the internal iliac (deep hypogastric) artery into view and the bifurcation of the common iliac artery. Extension of the iliac skin and muscle incision, and reflection of the parietal

(Legend continued on next page)

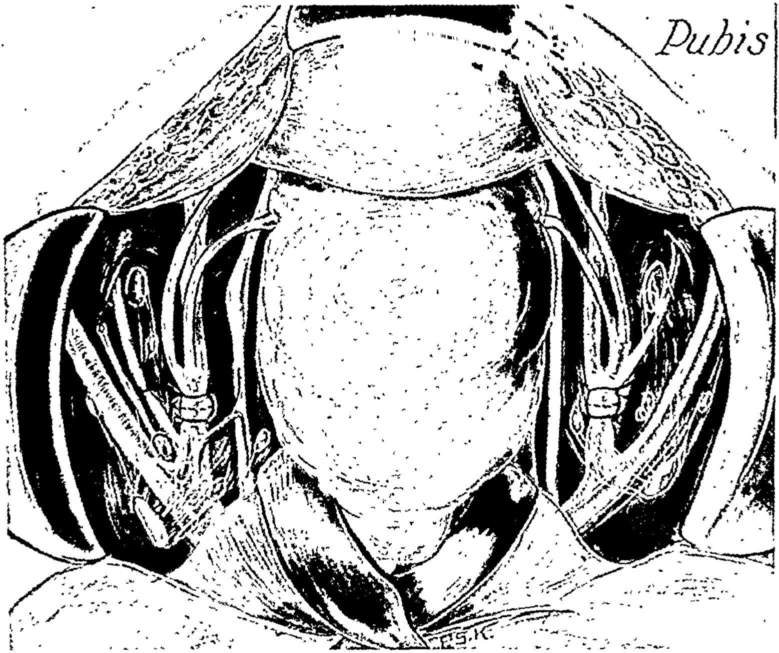


Fig. 4. This semidiagrammatic drawing shows the gland locations. The glands just external to the external iliac, the glands at the bifurcation and the glands of the obturator fossa are the main sites. The invasion of these glands may be delayed a long time after carcinoma of the cervix is diagnosed. In many cases there is fibrosis of the tissues after radiation, making dissection of the glands slightly more difficult. Iliac vessels are seen with ligation of both internal iliacs (starvation ligature). This starves the tissue and decreases the bleeding in the subsequent hysterectomy; one heavy silk ligature is sufficient. No extensive dissection is made of the parametrium at this time because of danger of much venous oozing.

(Legend continued from preceding page.)

peritoneum mediad will give exposure to aortic glands. The glands are dissected from the external iliac, the bifurcation of the common iliac, the obturator fossa, by sharp scissor dissection. The ureter is isolated except for its attachment to peritoneum. The internal iliac artery is now tied with a heavy silk ligature, by passing a long curved blunt tipped clamp around the vessel.

Presacral neurectomy can be carried out at this point by hooking fibers over sacrum and removing large segments of the nerve. An effort is always made to save the vessels to the ureter above the internal iliac ligation.

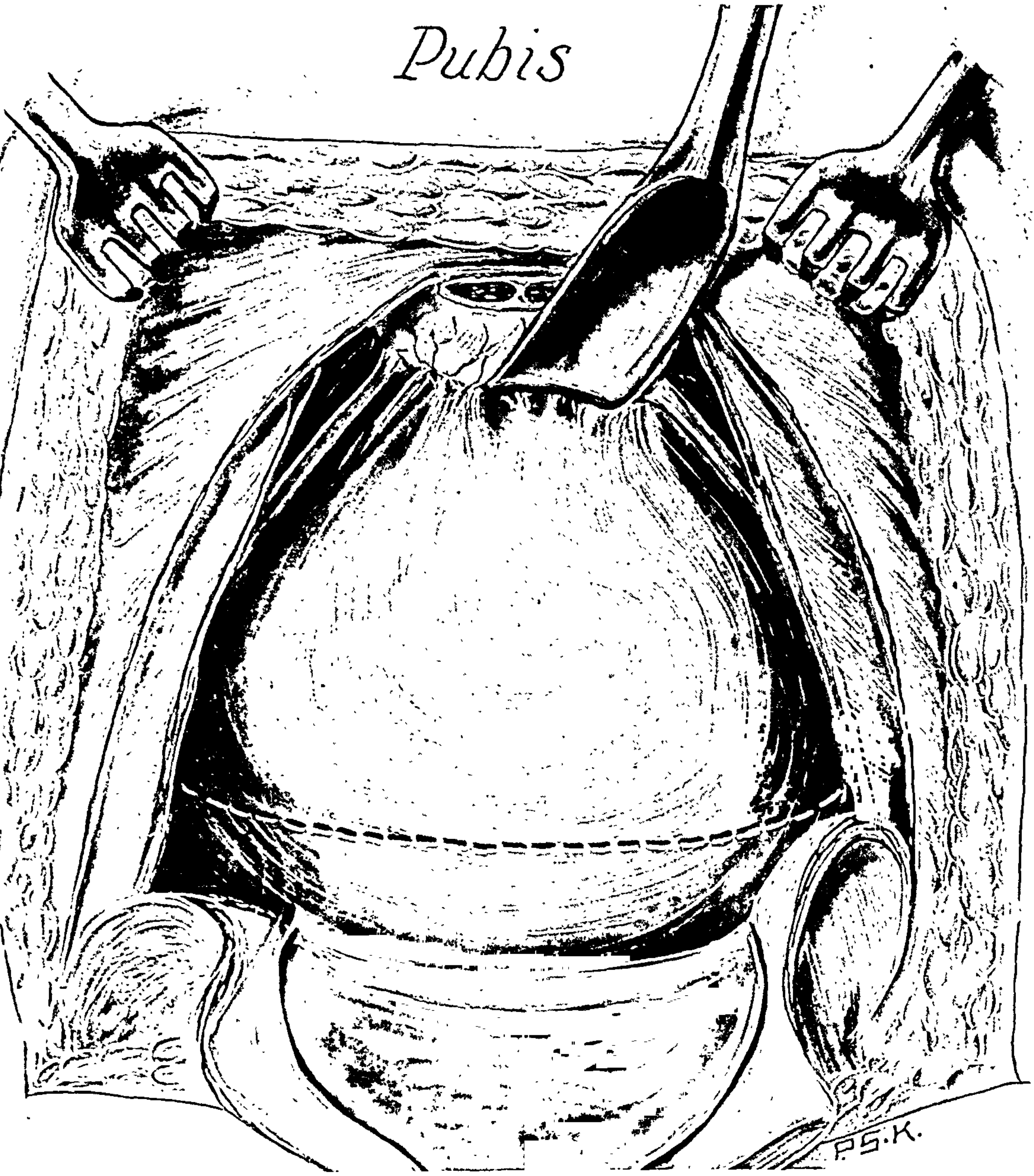


Fig. 5. Both rectus and abdominal muscles on each side have been reflected toward the umbilicus, exposing the parietal peritoneum. The retractors exposing the iliac vessels have been removed and the peritoneum falls back to its original position. The broken line shows the transverse incision which will be used to open the peritoneum. The incision in the peritoneum may be transverse or vertical for the radical total hysterectomy.

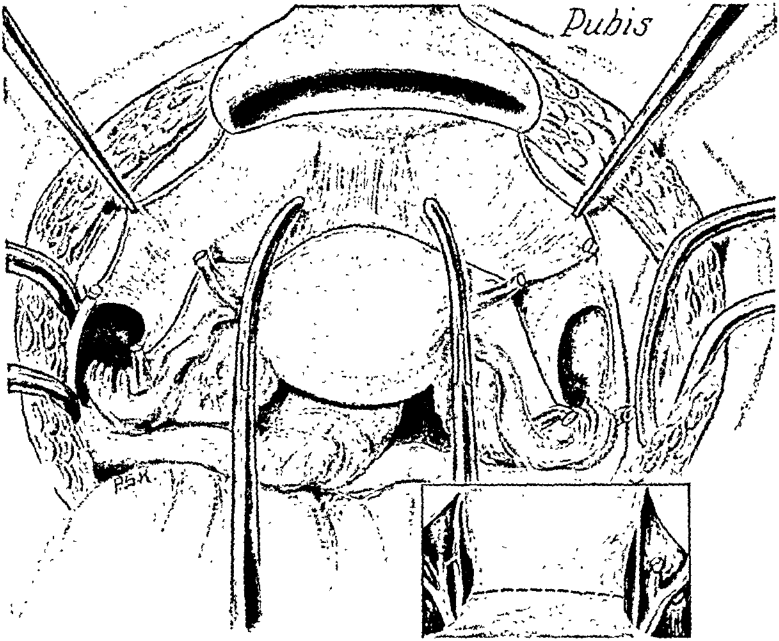


Fig. 6. The abdomen has been opened, large Balfour retractor is used for exposure. At this time presacral neurectomy can be carried out, instead of during the extraperitoneal part of the operation. The drawing shows the beginning of the extirpation of the uterus, adnexa and parametria as was advocated by Wertheim as a part of his operation for cervical carcinoma. The uterus is never grasped with a tenaculum. The infundibulopelvic ligaments and round ligaments have been freed close to the brim of the pelvis. It is our plan in future operations to ligate the ovarian vessels on each side as a step during the extraperitoneal part of the operation. With ligation of the internal iliacs this would control the major blood supply of the uterus, and would be of value in cases in which the Schauta operation (radical vaginal hysterectomy) would be preferable. The drawing also shows the exposure of the anterior peritoneal flap.

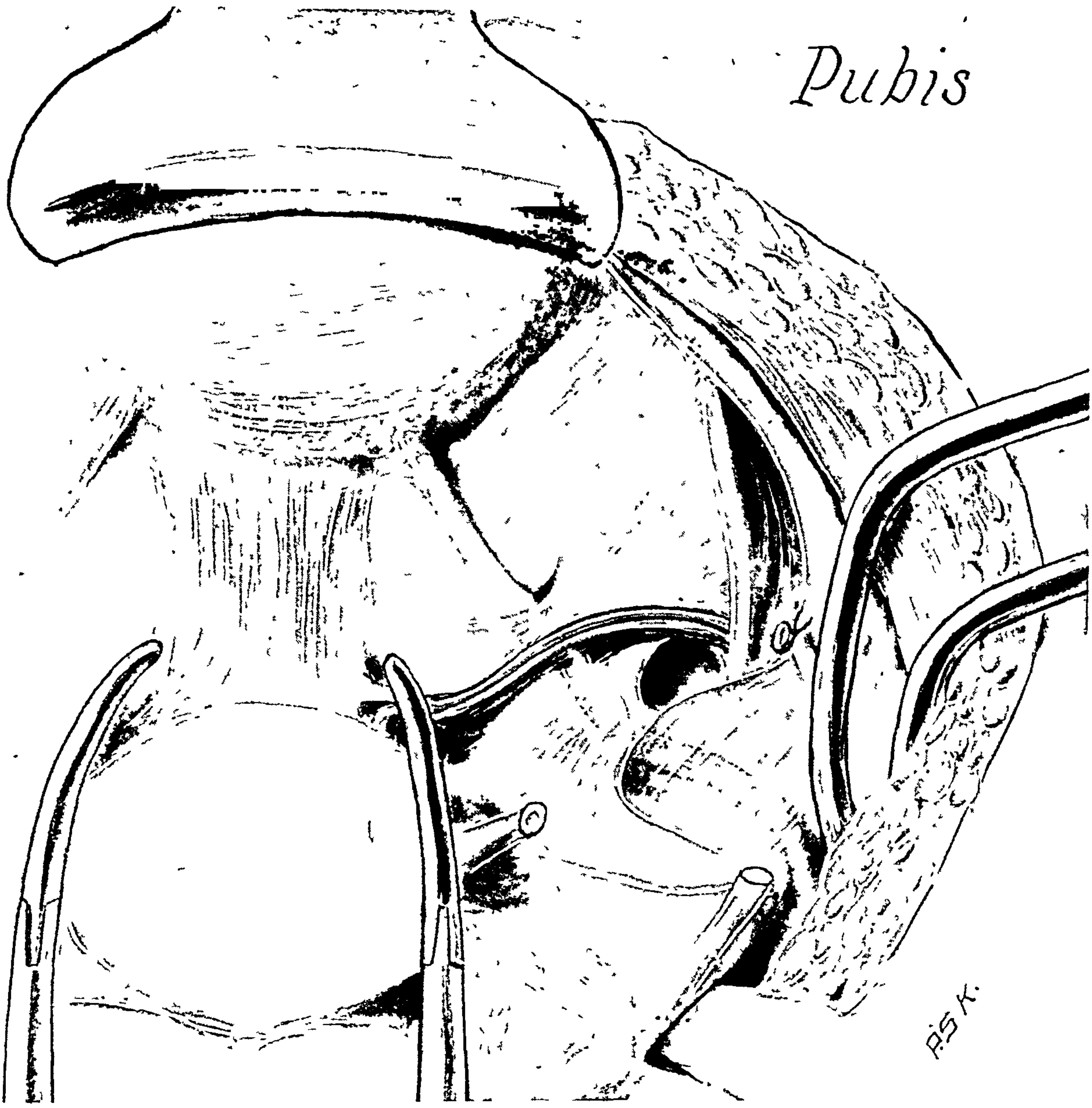
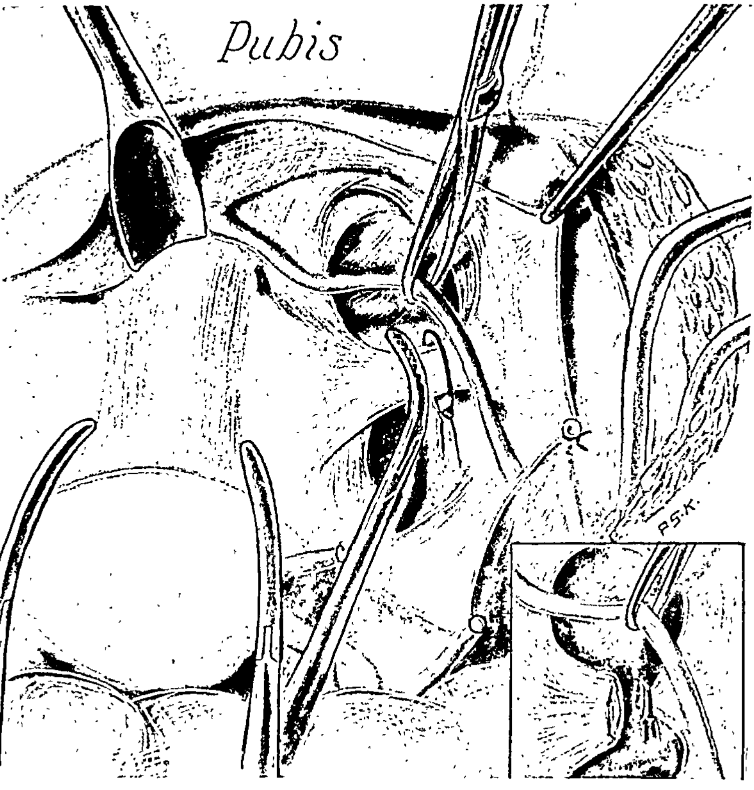


Fig. 7 This is an oblique view from the right showing the exposure of the ureter. In the extraperitoneal part of the operation (drawings 3 and 4), an attempt is made to save the blood supply of the ureter from the internal iliac. The ureter has been exposed but is left attached to the peritoneum on its peritoneal surface. In the region of the parametrium it will have to be dissected free and retracted to the lateral pelvic wall.

The uterine artery has already been tied off through the ligature of the internal iliac but it is better to ligate the parametrium anterior to the ureter. This ligature should be as close to the pelvic wall as possible. It prevents a small amount of oozing from these tissues and exposes the ureter more easily for retraction



g. 8. The ureter is retracted and the parametrial tissue posterior to the ureter is ligated as close to the lvic wall as possible. The maximum amount of parametrial tissue is removed by this technic with the least ssibility of injuring the ureter and producing ureterovaginal fistula. The ureter is exposed to its entrance into the bladder. The small insert shows the ureter elevated with Babcock forceps.

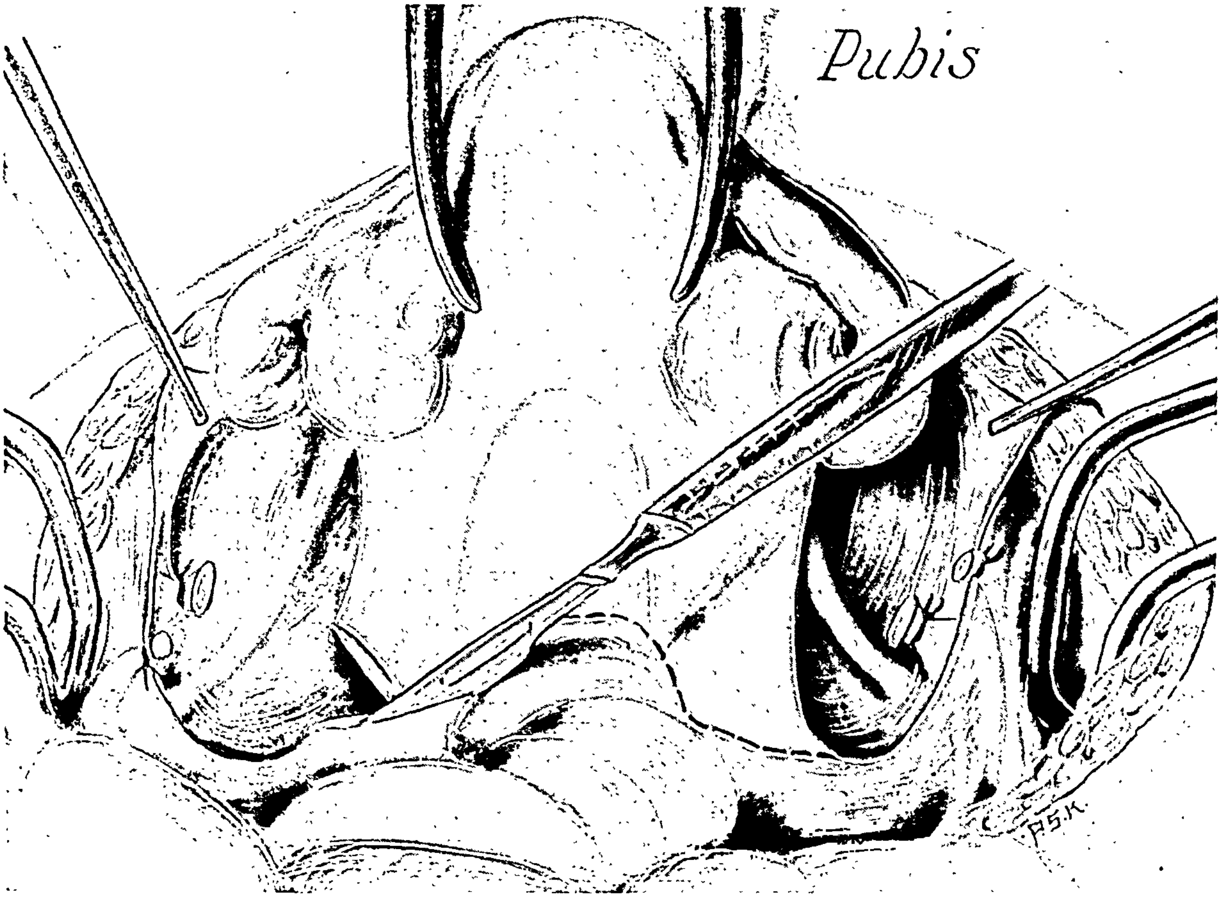


Fig. 9. The uterus is now brought toward the pubis, and the posterior peritoneum and sacrouterine ligaments are cut to free the uterus, and begin the separation of the rectum from the vagina. In this step the ureters must be retracted laterally to avoid injury.

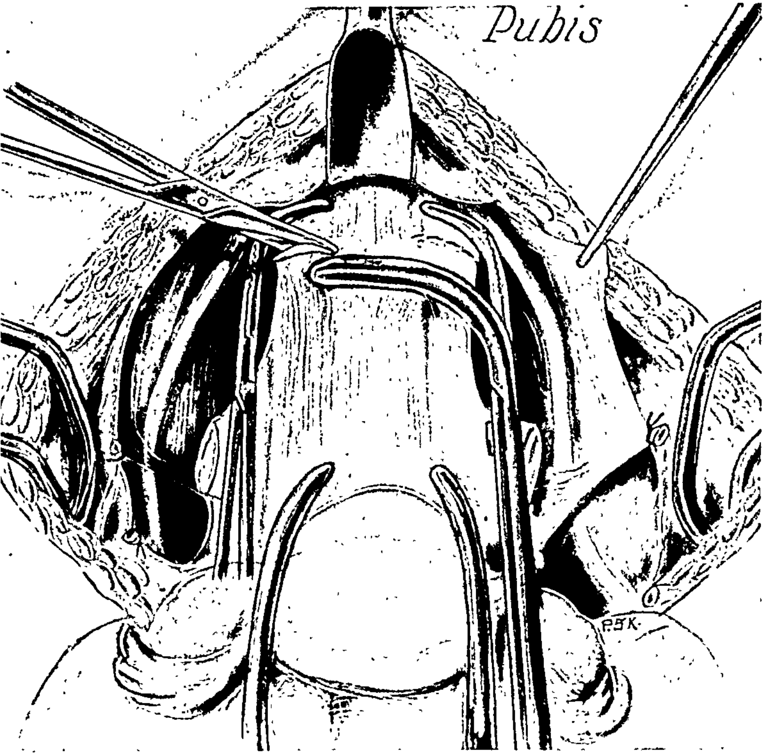


Fig. 10. Strong traction is now made on the uterus. The vagina is separated as far down as possible to btain a good cuff of vagina. This is necessary because of extension of carcinoma on the vaginal mucosa r retrograde metastasis. The paravaginal tissue is clamped on each side. A right-angle clamp of the Wertheim type closes the cuff of vagina to be removed and the vagina is cut across 3 to 5 cm. below the cervix. One vaginal packing 36 cm. long is now passed through the vagina to prevent fluid in the vagina from entering the abdomen.

If there is extension of the cervical carcinoma on the vaginal wall it would be possible for a second operator to free the vagina by a circular incision almost at the introitus and to pull the uterus through the vagina, therewith preventing abdominal contamination and removing practically all of the vaginal mucosa.

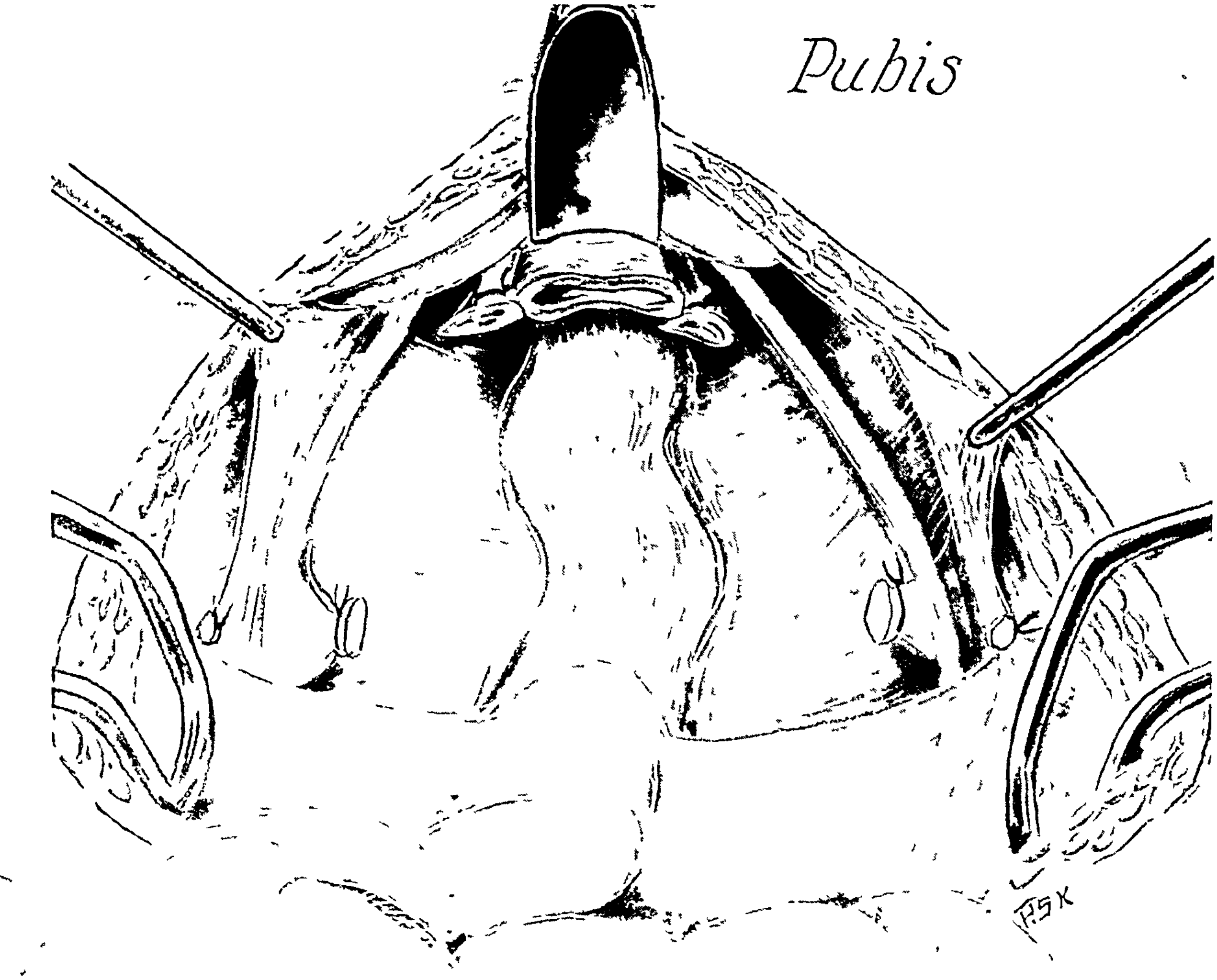


Fig 11 The paravaginal clamps have been replaced by suture Presacral neurectomy or aortic gland dissections can also be carried out at this part of the operation by splitting the peritoneum over the sacrum upward after the sigmoid is retracted to the left. Sulfa powder may be dusted into the pelvis if there have been many adhesions It is not absolutely necessary to peritonealize

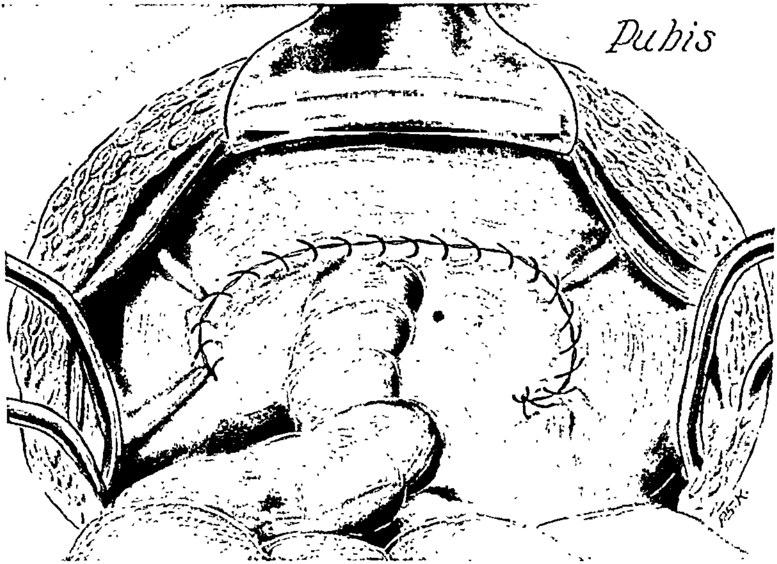


Fig. 12. Usually there is adequate peritoneum for closure with continuous catgut. No attempt is made to stitch the round ligaments or sacrouterine ligaments to the vaginal cuff for support.

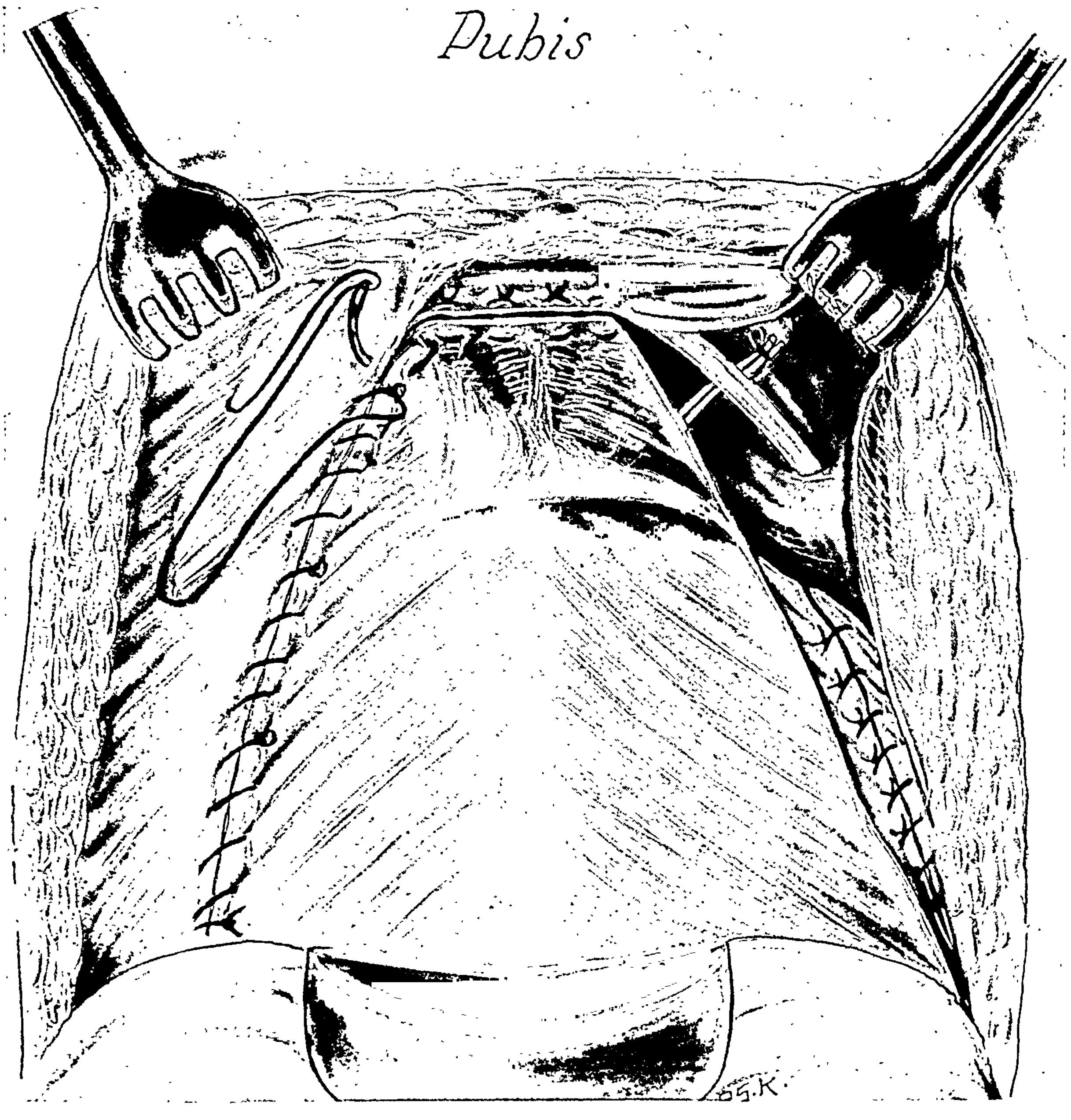


Fig. 13. The parietal peritoneum is now sutured. In the elliptical incision (large drawing 1) the transversalis and internal oblique are sutured in one layer of continuous suture for each side. The rectus and pyramidalis muscles are sutured with four interrupted mattress sutures. The external oblique muscles and fascia also are sutured with continuous chromic 1 with knot fixing every fourth suture. Chromic catgut 1 (40 day) is used for closing all layers of the abdomen, clips are used for the skin. No drains are used. With the use of the longitudinal incision in the obese patient both iliac incisions are closed before the abdomen is opened in the midline, and the midline incision is closed with continuous layers of chromic 1 (40 day) catgut with clips for skin.

Primary Carcinoma of the Gallbladder*

LOUIS J. GARIEPY, M.D., F.A.C.S., F.I.C.S.
AND
LAWRENCE WM. GARDNER, M.D.
DETROIT, MICHIGAN

THE abdominal surgeon may at any time in the course of gallbladder surgery be confronted with a primary carcinoma of the gallbladder. This neoplasm is not as rare as is generally believed, and its recognition and careful, adequate surgical extirpation is exceedingly important to the patient's welfare. The concept that carcinoma of this structure can rarely be treated by surgical removal is false. It is the aim of this report to present a complete study of 19 cases of primary carcinoma of the gallbladder. Cases of carcinoma of the extrahepatic ducts and sarcomas and malignant neurogenic tumors of the gallbladder are purposely omitted.

INCIDENCE

In our experience, the frequency of occurrence of primary carcinoma of the gallbladder is worthy of comment. This neoplasm was first described by Maximilian Stoll of Vienna in 1777. Until the latter part of the nineteenth century, only a few cases had been recorded in the literature. To the present time, approximately 2,300 cases of this neoplasm have been presented. The postmortem incidence of carcinoma of the gallbladder is indicated in Table 1.

TABLE 1. POSTMORTEM INCIDENCE

Author	No. Autopsies	Per Cent GB Carcinoma
Illingworth	13,034	0.33
Jankelson	11,400	0.27
Kirshbaum	13,330	0.40
Berencsy and Von Wolff	19,908	0.85
Gariepy and Gardner	900	0.11

Thus, the incidence varies from 0.11 per cent at Mount Carmel Mercy Hospital to 0.85 per cent at other institutions. These figures are quite constant and reliable.

The surgical incidence of primary carcinoma of the gallbladder is illustrated in Table 2.

TABLE 2. SURGICAL INCIDENCE

Author	No. Operations	Per Cent GB Carcinoma
MacCarty	5,000	0.50
Magoun and Renshaw	7,878	1.06
Judd and Gray	22,365	0.90
Erdmann	525	1.16
Mohardt	35,000	1.12
Hochberg and Kogut	1,200	2.50
Weiss	1,500	3.00
Gariepy and Gardner	1,777	1.01

It is seen immediately that on the operating table the figures become considerably higher. At our hospital, however, the surgical and necropsy incidence is practically identical. The diagnosis of primary carcinoma of the gallbladder was very carefully established. Five other cases were discarded since our pathologist was unable to establish definitely the primary site in the gallbladder itself. The cases reported by us are from a survey of gallbladder pathology during the first eight years that Mount Carmel Mercy Hospital has been in existence.

Only the stomach, colon, rectum and esophagus are commoner sites of cancer in the gastrointestinal tract than the gallbladder. It is possible that 50 years ago, cancer of the gallbladder may have been more frequent, since fewer patients were operated on for cholelithiasis. Confirmation of this hypothesis may be gained from a paper of W. J. Mayo (1902) when he reported a 5 per cent incidence in a series of 405 gallbladder operations. From 1907 to 1940, Vadhiem, Gray and Dockerty of the Mayo Foundation report 291 cases of primary carcinoma of the gallbladder in 33,500 biliary tract operations, resulting in an 0.87 incidence. In addition, pathologic examination at the present time may be more exact and thus many cases may be eliminated which were formerly accepted as primary carcinoma of the gallbladder.

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* For the Sixth International Assembly, International College of Surgeons, Rome, May 16-24, 1948.

The etiology of cancer of the gallbladder is not clear. Ewing suggests the following factors: (1) Mechanical irritation of calculi. (2) Inflammation that excites cellular hyperplasia. (3) Relation to cholesterol metabolism. (4) Irritative and digestive action of bile.

The relationship of cholelithiasis to carcinoma deserves special attention. Until recently, proof that carcinoma of the gallbladder may result from calculi had not been substantiated, although in 1947 Petrov and Krotkina presented conclusive experimental proof that sterile, hard, foreign bodies may produce primary carcinoma of the gallbladder. These investigators introduced either sterile glass tubes or glass tubes with radium into the gallbladders of guinea-pigs. One hundred animals were used in the experiment and 51 lived 14 months or longer. Of the latter group, five animals developed carcinoma of the gallbladder after 14 to 39 months, four showing distant metastases. In passing, it should be noted that spontaneous adenocarcinoma of the gallbladder has not been reported in guinea-pigs. We feel that this study is particularly significant, although there may be other unknown carcinogenic factors. From this evidence and other studies that incriminate gallstones as a causative factor, prophylactic cholecystectomy for calculi is strongly advocated, particularly in women. The emphasis given by Finney and Johnson for the early removal of the calculous gallbladder is entirely warranted.

Whether papillomatous changes in the gallbladder are significant lesions in the development of carcinoma is a debatable subject. Careful pathologic examination of extirpated gallbladders reveals approximately 1 per cent incidence at our hospital. No cases of malignant degeneration of a papilloma have been observed in our laboratory

AGE INCIDENCE

Carcinoma of the gallbladder is a disease most commonly seen in the sixth decade of life. Eleven of our patients (57 per cent) were in this age group. The youngest patient was 47 and the oldest 77 years of age. Table 3 indicates the age distribution.

TABLE 3. AGE DISTRIBUTION

Age	Cases
45–50 years	1
51–55 years	1
56–60 years	3
61–65 years	5
66–70 years	6
71–75 years	2
76–80 years	1
Total	19

SEX INCIDENCE

Carcinoma of the gallbladder affects the female more commonly than the male. In our series, 14 patients (74 per cent) were women and five patients (26 per cent) males, a ratio of approximately 3:1. In the literature, ratios of 4.5:1 are frequently given. Probably the higher incidence of cholecystitis and cholelithiasis in the female patient accounts for this higher ratio of females to males. Table 4 illustrates the sex distribution.

TABLE 4. SEX DISTRIBUTION

Sex	Cases
Females	14
Males	5
Total	19

CHOLELITHIASIS

Sixteen patients (84 per cent) had calculi in the gallbladder. In the literature, the figures vary considerably, and the figures in Table 5 may be given as representative.

Cholecystitis is invariably present. The hypothesis that chronic local irritation predisposes to cancerous changes is borne out in a review of our cases. The presence of stones may produce a proliferation of the mucosa and if the process is uncontrolled, a neoplasm results.

TABLE 5

Author	With Calculi Per Cent
Miller	36
Judd and Gray	65
Illingworth	65
Boyce and McFetridge	73
Vadhiem, Gray and Dockerty	88
Siegert	95
Janowski	100
Gariepy and Gardner	84

TABLE 6. PATHOLOGY

Types	*Per Cent*
Papillary adenocarcinoma	58
Scirrhous adenocarcinoma	42
Colloid adenocarcinoma	*10*
Squamous cell carcinoma	5

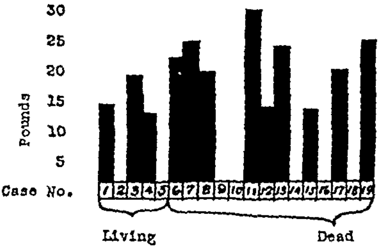
TABLE 7

Chief Complaint	*Cases*
RUQ pain	16
Jaundice	1
Vomiting	1
Drainage from RUQ wound	1
Total	19

TABLE 8

Significant Facts	*Cases*
Tenderness in RUQ	18
Icterus	13
Weight loss	11
Nausea and vomiting	14
Palpable mass	9

TABLE 9. WEIGHT LOSS



PATHOLOGY

The pathologic anatomy of carcinoma of the gallbladder may be conveniently divided into four groups (Table 6).

A definite distinction between the first three types is somewhat artificial, since more than one type of structure may be found in any given case. If the papillary carcinomas showing considerable infiltration of the wall are included in the scirrhous malignancy, the latter is considerably more commonly encountered than indicated above. The fundus of the gallbladder is the primary site of origin in approximately 75 per cent of carcinomas and the infundibulum in approximately 25 per cent.

Grossly, the papillary type of tumor produces an encephaloid, bulky tumor nearly filling the gallbladder. The structure is commonly enlarged three to four times normal size. In many cases it is nearly impossible to determine the site of origin anatomically in the gallbladder itself. A few of these tumors undergo mucinous changes in which a thick tenacious, jellylike material may be easily scraped from the cut surfaces. The scirrhous type of neoplasm is associated with a moderate to marked desmoplastic reaction producing a thickening of the gallbladder wall. The squamous cell carcinoma is indeed rare. Only one case was found in our series. Grossly, the characteristics are similar to that noted in the scirrhous type.

Microscopically, two distinct varieties are seen, that is, adenocarcinoma and squamous cell carcinoma. The adenomatous tumors may present a papillary, scirrhous or colloid form. The latter contains numerous "signet ring" cells and a moderate amount of mucus. Apparently, the squamous cell variety represents a definite metaplasia from the mucosal epithelium and may be more correctly designated as an adenoacanthoma.

The mode of spread is worthy of attention. By direct extension, it may invade the hepatic parenchyma, the extrahepatic ducts, stomach and duodenum. The colloid form may produce numerous peritoneal and omental implants throughout the upper abdomen. Intravascular spread occurs through the venous drainage of the gallbladder directly into the liver by way of the portal circulation. The cystic veins drain into the portal vein. By the lymphatic system, the cystic, periportal, pancreatic and retroperitoneal lymph nodes are involved in the order indicated. Distant metastases are rare.

CLINICAL ASPECTS

The onset of this disease is insidious, and the clinical syndromes presented are varied. The correct diagnosis was not made preoperatively in any of our cases. Naturally, the clinical picture depends upon the location of the lesion, duration of the neoplastic process, the degree of malignancy, and the presence or absence of metastases, etc., so that a typical syndrome is not seen. Nevertheless, in a review of our cases some elements became clarified. For instance, chief complaints have been tabulated in Table 7 which when broken down into facts may be noted in Table 8. Weight loss is shown in Table 9. Duration of illness varied from one week to 25 years, with an average duration of 6 months.

Varying degrees of icterus were present in 13 (69 per cent) of our cases. The icteric index ranged from 8 to 20 units in the majority of instances. Ascites or peripheral edema was not recorded in any case. The terminal symptoms of cachexia and hemorrhage are related to extensive hepatic involvement. On examining a few of our cases preoperatively, we were impressed by the fact that we were dealing with a primary tumor of the head of the pancreas. In the majority of instances, however, a diagnosis of chronic cholecystitis and cholelithiasis was given.

DIAGNOSIS

As previously indicated, the diagnosis of carcinoma of the gallbladder is extremely difficult and rarely suspected. Unfortunately, laboratory tests are not pathognomonic. Except in confirming the diagnosis of a nonfilling, nonfunctioning pathologic gallbladder, cholecystography is of little value. Of course, gallstones are commonly demonstrated. Thus, the failure to diagnose the cancerous disease prior to operation is not remarkable. These cases usually are diagnosed as cholelithiasis. In the differential diagnosis, however, one must consider carcinoma of the head of the pancreas, diverticula of the second portion of the duodenum, carcinoma of the duodenum and hepatic vessels. Peritoneoscopy is not of value in the early or late diagnosis of carcinoma of the gallbladder.

TREATMENT AND RESULTS

Regardless of the primary site of a neoplasm in the gastrointestinal tract, the control of cancer can achieved only by
exhaustive clinical followed by
early removal of th still
more or less local.
signs and symptom
so that potential pat
it is too late. Prom
ment must follow. In ca
creas, preoperative diagnosis
moderately advanced lesions is no
sible. Therefore, a prophylactic app
essential. Surgical removal of the gallb
in cases with calculi is indicated.

In our series of cases, 13 were treated cholecystectomy with or without the removal of the adjacent hepatic beds, 5 were treated by cholecystotomy for drainage, and one advanced neoplastic process was treated by a gastroenterostomy. The results of these surgical procedures are indicated below.

TABLE 10. LONGEVITY FOLLOWING SURGERY

Case	Time
1	18 months
2	2 years
3	3 years
	7 years
	7 years

to other parts of the
con impossible. Of
the still alive, cases
No. 3 for an acute
gang lecystotomy
was p The diag-
nosis in the
excised of cases.

no metastases or extension into the liver were found. Cystic or portal lymph nodes were involved in three cases and apparently the neoplastic glands were completely removed.

TABLE 11. MORTALITY

Case	After Surgery
*6	3 days
*7	3 weeks
8	1 month
*9	1 month
10	6 weeks
*11	3 weeks
12	6 months
*13	8 months
14	12 months
15	15 months
16	3 years

* Liver metastasis at operation

The study of primary carcinoma of the gallbladder is not a pleasant one and there is very little evidence to suggest any improvement in the treatment except for early diagnosis. Nevertheless, we do not share the hopelessness of many writers, inasmuch as 26 per cent of our patients are alive and apparently well from one and a half to seven years following cholecystectomy. In reviewing the literature and our cases we are convinced that all gallbladders containing calculi should be removed if they create symptoms that cause the patient to seek medical attention.

SUMMARY

1. Nineteen cases of primary carcinoma of the gallbladder are presented in this study.
2. Cholelithiasis is the most important single factor in the etiology of primary carcinoma of the gallbladder.
3. The signs and symptoms are not characteristic, but the elicitation of a slight or moderate weight loss is a significant factor.
4. Prophylactic removal of gallbladders harboring stones is imperative.

SUMARIO

19 casos de carcinoma de la vejiga de la hiel han sido presentados en este estudio. La litiasis biliar es el factor mas importante en la etiologia del cancer primario de este organo. La semiologia no es caracteristica, sin embargo la perdida de peso es un indicia significativo. La colecistectomia es imperativa como medida preventiva del cancer en el tratamiento de la colelitiasis.

RIASSUNTO

Le conclusioni raggiunte dall'A. si basano sopra l'osservazione di 19 casi di cancro primitivo della cistifellea. Nell'etiologia di questi tumori i calcoli apportano un notevole contributo. I sintomi della malattia non sono purtroppo patognomonici: una perdita progressiva di peso rappresenta il sintomo piu' comune.

L'A. raccomanda la colecistectomia quale misura precauzionale.

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Diverticulitis of the Colon: A Plea for Early Surgical Intervention *

S. H. BABINGTON, M.D., F.I.C.S.
BERKELEY, CALIFORNIA

SPACE does not permit an exhaustive discussion of the anatomy, physiology and pathology of diverticula of the colon. Suffice it to say that a diverticulum usually is an acquired outpouching or herniation in the wall of the colon. There are a great many people with diverticula of the colon who are not conscious of their presence, as has been attested by disclosure of such outpouching in x-ray studies and necropsy in those in whom during life the diverticula had been symptomless. As a matter of fact, symptomless diverticulosis is most frequently diagnosed at autopsy, since it is often missed in the x-ray examinations of the colon with barium.

INCIDENCE

Reports from various clinics indicate that 5 to 10 per cent of all patients submitted to roentgenologic examinations have colonic diverticula. Also, it has been demonstrated that diverticula occur in 5 per cent of consecutive necropsies on persons who were known to be free of the symptoms of diverticulitis. The incidence of diverticulosis increases with age, and it is estimated that at least one of every 10 persons past 40 has diverticula of the colon.

The number of diverticula present may vary from a solitary diverticulum to hundreds. One or any number of these may become inflamed from time to time, giving rise to diverticulitis and subjective and objective symptoms as varied as the number and location of the inflamed diverticula.

The following statistical data were obtained by reviewing material in the record department of the Highland Hospital of Alameda County, Oakland, California, through the courtesy of Dr. Otis Whitecotton, Medical Superintendent. Of a total of 134,388 admissions, 34 patients were discovered to have diverticula of the colon without symptoms. These findings were incidental, the patients having been admitted for unrelated conditions. The number of patients who entered the hospital with a primary diagnosis of diverticulitis numbered 79 (Table 1).

TABLE 1. TOTAL HOSPITAL ADMISSIONS, 134,388 (1934–1946, INCLUSIVE)

Colon	Male	Female	Total
Diverticulosis:			
No inflammation			
Secondary diagnosis	15	19	34
Diverticulitis:			
Primary diagnosis	24	55	79
Totals	39	74	113

Undoubtedly these figures are not a good index of the incidence of diverticulitis or of the ratio between diverticulosis and diverticulitis since only a small percentage of all patients admitted had x-ray studies of the colon. Besides, it is a well-known fact that many milder cases of diverticulitis go without treatment or receive home or office treatment and therefore never appear in statistical studies compiled from hospital records.

All of the cases of diverticulitis in this series were severe enough to be hospitalized and the patients were so ill as to be admitted directly to the surgical service. This is to be expected when one notes that these were charity cases usually seeking relief only after they are seriously ill. A fair number of these cases had other diseases associated with diverticulitis requiring attention, thus complicating the situation (Table 2).

In our series, diverticulosis was more than twice as common in the female as in the male, the ratio being 79:34, contrary to most of the reports in the literature.

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* Read before Twelfth National Assembly, United States Chapter, International College of Surgeons, Chicago, September 28–Oct. 4, 1947

TABLE 2. DIVERTICULITIS: 79 CASES

Associated Diseases	
Appendicitis	1
Arthritis, infectious	1
Bronchiectasis	1
Cholelithiasis	1
Colitis	2
Colostomy (old)	3
Cystitis	2
Diaphragmatic hernia	1
Esophageal hernia	1
Hypertension	2
Inguinal hernia	2
Proctitis, atrophic	1
Pyelitis	1
Pylorospasm	1

The fact that no colonic diverticula were found in patients under the age of 21 and that none of the 113 patients with diverticula of the colon had coincidental congenital diverticula of any kind such as Meckel's diverticula, suggests that they are *acquired* rather than congenital lesions. The primary cause is the lack of longitudinal muscle fibers in the large bowel, augmented by age, obesity and constipation.

Age Incidence. In this series, colonic diverticulosis began making its appearance after the age of 20, steadily increasing in number. By the age of 60 its incidence had increased eight-fold. The age distribution of diverticulosis, with and without inflammation, is shown in Table 3.

TABLE 3. AGE INCIDENCE IN COLONIC DIVERTICULOSIS

	Cases		
Age	With Inflam.	Without Inflam.	Total
0–20	0	0	0
21–30	3	0	3
31–40	0	2	2
41–50	8	0	8
51–60	14	9	23
61–70	26	5	31
71–up	28	18	46
Totals	79	34	113

Meckel's Diverticulum. In 134,388 admissions there were 9 cases of Meckel's diverticula, in three of which this was the primary diagnosis, while six were discovered during appendectomies. This is not a gauge of the percentage of Meckel's diverticulum since most of the patients admitted to the hospital were not explored or studied with Meckel's diverticulum in mind. It is significant, however, that none were noted in those patients who suffered from diverticulosis and diverticulitis (Table 4).

TABLE 4. TOTAL HOSPITAL ADMISSIONS, 134,388 (1934–1946 INCLUSIVE)

Meckel's Diverticulum	Male	Female	Total
With diverticulosis			
Secondary diagnosis	3	3	6
With diverticulitis *			
Primary diagnosis †	3	—	3
Totals	6	3	9

* All cases of diverticulitis were operated upon. One terminating fatally was brought in with acute intestinal obstruction from adhesive band over Meckel's diverticulum.

† *One with peptic ulcer with massive hemorrhage in the diverticulum, child aged 10.*

SYMPTOMS

In 36, or 45.5 per cent, of the 79 hospitalized cases of colonic diverticulitis, the chief complaint was tenderness and pain in the abdomen. The pain was described by 20 as dull, while 16 called it sharp. Constipation as a chief complaint ranked second in 14 cases. Nausea was third in 12, hemorrhage from the bowel fourth in 9, and diarrhea fifth in 8. Most of the patients gave a history of symptoms over a period of several days, with three exceptions in which they had been present less than 24 hours. Tenderness and dull pain had been experienced for 10 years or more by several patients (Table 6).

With perforation, the symptoms of shock, spreading peritonitis, or any of its complications may be added to the above (Table 7). One perforation was in the cecum and the majority of the others in the sigmoid. Unfortunately, surgery is often postponed until fatal complications have developed, as in our series of 79 cases. Surgical results could be improved only by early surgery.

TABLE 6. CHIEF SYMPTOMS

Symptoms	Duration						Total No. Cases	Percentage
	3–24 Hrs.	1–6 Days	1–4 Wks.	1–6 Mos.	6–12 Mos.	Over 1 Yr.		
Tenderness and dull pain...		3	3	5	4	5	20	25.3
Tenderness and sharp pain..	3	8	4	1	0	0	16	20.2
Constipation..............		4	3	1	4	2	14*	17.7
Nausea-Vomiting..........		8	1	2	0	1	12	15.3
Hemorrhage..............		3	1	1	3	1	9†	11.4
Diarrhea................		4	0	1	2	1	8	10.1
						Total:	79	100.0

* In 1 case 10 years; in 4 others the time varied up to 15 years.
† One patient had massive hemorrhages requiring transfusions.

TABLE 7. COMPLICATIONS

Complication	Cases
Peritonitis, early	7
with abscess or mass *	4
with fistula (vesical)	1
with obstruction	2
Massive hemorrhage	1
Admitted for closure of old colostomy	2

* 1 perirectal, 2 rectosigmoid, 1 pelvic.

DIVERTICULITIS AND APPENDICITIS

In many ways diverticulitis can be compared with appendicitis, each being an inflammation in an outpouching of the intestinal wall. The distribution of pain, tenderness, and complications will vary as widely as the location of the diverticula.

With diverticulitis occurring most frequently in the sigmoid, the symptoms and signs are referable to the midline or left lower quadrant as contrasted with the usual right lower quadrant in appendicitis. Hence we hear diverticulitis referred to as left-sided appendicitis with the familiar symptoms of nausea, vomiting, and cramplike abdominal pain beginning about the umbilicus and descending to the left lower quadrant And, as in appendicitis, fever, increase in leukocyte count with a shift to the left, slight distention, and some change in bowel action are found. In diverticulitis, however, there may be blood in the stool. Though appendicitis is common in the young, diverticulitis is found usually in people past forty. Roentgenograms made during an attack may fail to localize the seat of the trouble since barium cannot enter an inflamed edematous and virtually blocked diverticulum.

POSTOPERATIVE MORTALITY

In our series the postoperative mortality was very high—35.5 per cent. Surgery was performed by various members of the surgical staff in all of these cases after complications had developed. No radical surgery, such as bowel resections or anastomoses, was performed. Perforation was treated conservatively by simple closure with or without colostomy. Of 17 cases of diverticulitis operated on, 6 died; 4 cases of diverticulitis died without benefit of surgery (Table 8).

TABLE 8. DEATHS IN DIVERTICULITIS

Operation	Cases	Deaths *	
Drainage	9	4	6, or 35.3%
Ileostomy	1	1	
Colostomy	4	1	
Cecostomy	1	—	
Repair of old colostomy	2	—	
Died without surgery †	—	4	
Total	17	10	

* All deaths were from perforation.
† Two were moribund on admission. Postmortem diagnosis.

Though this is a high mortality rate, it compares favorably with reports from most of the well-known clinics and hospitals in the country, especially when one keeps in mind that most of these cases were operated upon prior to the advent of sulfonamides and penicillin. What, then, is the reason for so high a mortality rate in surgery of diverticulitis of the colon?

The answer is simple. Diverticulitis of the colon is considered a medical problem and the surgeon steps in only after complications have set in.

EARLY SURGERY

In spite of the similarities between appendicitis and diverticulitis, there are marked differences in the accepted method of treatment for the two conditions. In appendicitis, immediate operation is recommended, while in diverticulitis of the colon, conservative treatment is urged. There is evidence, however, that our attitude toward the treatment of diverticulitis is tending toward radical change, especially in those cases in which there are repeated attacks or where there is danger of complications.

The mortality rate in appendicitis has been so greatly reduced that today no one expects a fatal outcome with early appendectomy. In diverticulitis of the colon early intervention will effect a like good result. It is important to recognize that management of diverticulitis is no longer a medical problem. A simple diverticulectomy should be just as life-saving a measure as is simple appendectomy. With our present accurate surgical technics, our careful preoperative and postoperative care and the use of antibiotics, we should not hesitate to do an early simple diverticulectomy on these cases so as to prevent the development of complications.

Delay is the major cause of the high postoperative mortality in diverticulitis. Complications in diverticulitis are of much more serious portent than they are in appendicitis Perforation in appendicitis, because of its location, usually results in an abscess which is easily drained. A perforated diverticulum, unlike an appendix, produces sinuses, fistulae and spreading peritonitis. The sinuses and fistulae often penetrate into the bladder, ureters, urethra, rectum and vagina. In the presence of these complications, a high postoperative mortality may be expected. A perforated appendix usually requires only simple drainage. A perforated diverticulum requires a colostomy which may have to be kept open from six months to two years, requiring additional surgery if the patient survives. Mortality is practically nil with diverticulectomy, while after perforation it may be as high as 35 per cent.

Of course, in diverticulitis one may be confronted with more than one inflamed diverticulum and the question is whether all should be removed. The answer is yes, if they are inflamed. If desired, additional noninflamed diverticula may also be removed provided the patient's condition and the length of operation permits. It is a simple matter to remove quickly five or six diverticula, provided the intervention is undertaken early. It is the stage of the disease that determines the outcome of surgery and not how much surgery is done.

Rarely more than a few diverticula are inflamed at one time. Usually it is these inflamed diverticula which cause the repeated attacks. *After these few diseased diverticula* have been removed, the patient frequently remains well.

If the inflammation is massive, that is, if many diverticula are involved and the removal of the diverticula individually is impossible, then that portion of the intestine may require a resection. This resection can be made in one stage if again the operation is performed very early before there is extension of infection into the mesentery and lymphatics in general. Primary anastomosis is fraught with great danger if one waits until abscess has formed.

Since the advent of sulfonamides and penicillin, mortality in colon surgery has dropped from 25 to 5 per cent or less, and today one-stage colectomies for carcinoma are being done with great safety. There is no reason why the same should not hold true for colectomies performed for massive diverticulitis, if the procedures are carried out before perforation, peritonitis, or abscess has developed.

In simple cases early diverticulectomy will render unnecessary all complicated surgical procedures and reduce mortality to a minimum, as in appendicitis. Early surgery, even in most of the cases of massive diverticulitis will permit resection with primary anastomosis and evade the necessity of colostomy, ileostomy, and cecostomy which the patient often must tolerate for a year or two before a second or third operation is performed for the cure of his condition, provided he survives.

CASE REPORTS

The following few cases from private practice are cited to bring out the need of early surgery, the importance of double contrast media in diagnosis, and to illustrate some of the points touched upon in this paper.

Case 1. This is a vivid example of a long-missed diagnosis. In 1946 I saw a woman, age 68, who was suffering from nausea, vomiting, diarrhea and a left lower abdominal pain with fever. She had had similar attacks for 30 years at least twice a year. She had been seen by physicians and treated medically. Any patient with unexplained acute attacks such as hers should have the benefit of barium studies. Barium enema revealed a few diverticula of the sigmoid. These I removed surgically; they were found to contain fecaliths. Since then she has been free of her attacks of diverticulitis.

It would seem obvious that it is poor practice to permit a woman to suffer for a month out of every year for 30 years when a simple diverticulectomy could have saved her from these very distressing attacks. It was her good fortune that perforation had not occurred in all these years. Nevertheless, the danger was there and perhaps with the next attack she would have developed an abscess, fistula or generalized peritonitis. In that case surgery would have become a hazardous venture.

In the following case, barium enema alone was of no value. Contrast air also had to be used to bring out the diverticula in her colon.

Case 2. Eleven years ago this woman came to me complaining of attacks of nausea, vomiting, constipation, fever and left abdominal pain at intervals of two to three months for nine years, each attack lasting several weeks. The cause of her illness had become a mystery. She had been examined by many physicians in three states without any feasible explanation for her symptoms. She came to me armed with old x-ray films including those of barium enemas taken in various hospitals. They showed nothing. We repeated barium enemas plus air medium. This technic revealed the presence of three diverticula in the left colon, one of them as high as the splenic flexure. After these were removed she became free of symptoms and has been well to date. At that time she was 58 years old. This woman was suspected of addiction, and it was felt that she was putting on an act to get "dope." Now for eleven years she has been free of her symptoms and has not felt the need of any pain killer.

If diverticulitis is in the cecum, the case may be mistaken for appendicitis. At surgery one will find a normal appendix with an acute diverticulitis within a short distance of the base of a normal appendix.

Diverticula in the cecal region are supposed to be rare and yet recently I operated on two such cases successively.

Case 3. The patient a female in her forties, for two months before admission to the hospital had been suffering from constipation and vague colic in the right lower abdomen that persisted about McBurney's point. She used cathartics exclusively to relieve herself of constipation. No bloody or tarry stools were noted. The pain had no relation to foods or eating. There was no referred pain suggestive of renal colic, no bloody urine or dysuria. The menstrual periods were regular and unchanged in frequency or duration. The last menstrual period was three weeks previous to admission to hospital. There were no symptoms of pregnancy. The patient made several visits to her local doctor, but received no satisfactory diagnosis. No x-rays were taken.

About 24 hours before admission to the hospital her pain became so severe that it awakened her from sleep. The pain on the right was cramping as though she had to move her bowels. Over a period of 24 hours it became very severe and her abdomen very tender when jarred or bumped. Even her clothing was irritating to the skin. She was not nauseated but did have anorexia, without diarrhea or dysuria. She was entered as an emergency case and explored. Routine laboratory tests were normal.

A right rectus incision was made. No free fluid was encountered. The cecum was delivered from the wound. The terminal 2 inches of the cecum and the terminal 1 inch of the ileum were covered with a fine recent serofibrinous exudate which did not wipe away easily. There was some induration in the wall of the last 4 inches of the cecum and an inflamed diverticulum measuring approximately 1½" x ¾" was found lying alongside the appendix. The diverticulum was about to perforate. It was removed and the edges inverted with a mattress suture. The appendix also was removed though it showed no signs of inflammation. No Meckel's diverticulum was seen. The uterus, tubes, and ovaries were found to be normal. Five grams of sulfadiazine were sprinkled about the lower portion of the cecum and the wound closed in layers without drainage. Recovery was uneventful and the patient has been well since. Had we waited until perforation took place we would have had to resort to complicated surgical procedures and perhaps lost the patient.

The following case illustrates how sometimes a perforation may take place quickly without very much warning. All do not fare as well as did this old man.

Case 4. The patient was 76 years old and had been in very good health all his life. For about two months before admission to the hospital he suffered from constipation and took a great many cathartics. His weight remained the same. There were no bloody or tarry stools, and no change in appetite. On the evening of his admission to the hospital, he suddenly became very nauseated and vomited several times. He had a severe chill and temperature rose to 103° F. He became disoriented and could give no history. The patient's daughter reported that he complained of no pain, but within one hour after the onset, the doctor found him to have a very tender abdomen, especially in the left lower quadrant, accompanied with marked distention.

He was hospitalized immediately. Physical examination revealed a delirious, acutely ill old man. Blood pressure 140/90. A soft systolic aortic murmur was heard. The abdomen was moderately distended with muscle guarding in the left lower quadrant. Bowel sounds were active but not obstructive in character. Rectal, as well as abdominal examination, showed no masses. The urine had 2 plus albumin, a trace of sugar, and many granular casts. Serology was negative. Blood: 4,120,000 red blood cells, 12,100 white blood cells with 80 per cent polymorphonuclears. Barium enema revealed leakage through a perforated diverticulum in the sigmoid region. The abdomen was opened through a left McBurney incision. The area of the ruptured diverticulum was readily located. A tube was placed in the lumen of the intestine and the intestinal serosa sutured tightly around the tube, using plain catgut. Two additional cigarette drains were placed in the peritoneal cavity. Sulfathiazole powder was sprinkled into the wound and abdomen closed in layers. Though he had a stormy convalescence, he recovered and has been doing well.

SUMMARY

1. Diverticulum of the colon is an acquired lesion starting in the late teens and increasing rapidly in incidence after the age of 40. The primary cause is a lack of longitudinal muscle fibers in the colon. This is aggravated by age, obesity and constipation. In our series none of the patients with diverticula of the colon had Meckel's diverticula, indirect evidence that colon diverticula are acquired lesions.

2. The surest way of diagnosing diverticula of the colon is at autopsy. In the living a barium enema with contrast air and spot filming is the best means of diagnosing this condition.

3. Since diverticula of the colon are outpouchings of the bowel wall, when inflamed they produce the same type of symptoms as the inflamed appendix. The location of these symptoms varies with the location of the diverticulitis. The complications of diverticulitis, however, are more serious than those of appendicitis.

4. The accepted method of treatment for appendicitis is immediate surgery, while that for colonic diverticulitis is medical until complications develop. Despite this currently held view, patients with acute diverticulitis of the colon should be considered surgical cases and surgery performed on them as early as possible before peritonitis, abscess or perforation have set in. Only in this way can the high mortality be reduced as has been done in appendicitis. Furthermore, early surgical intervention does avoid complicated surgical procedures which often have to be repeated over a period of years with doubtful and uncertain results.

SOMMAIRE

1. Le diverticule du côlon est une lésion acquise dans l'adolescence et d'une incidence plus fréquente après l'âge de quarante ans. La cause primaire est une déficience de fibres musculaires longitudinales du côlon. Dans notre serie de malades présentant des diverticules du colon il n'y eut aucun cas de diverticule de Meckel, temoignage indirect indiquant que le diverticule du côlon est une lésion acquise.

2. Le diagnostic précis ne se fait souvent qu'à l'autopsie, chez le vivant un énéma de barium, qui met en contraste l'air et les

taches, est la meilleure méthode dont nous disposons actuellement pour faire le diagnostic de cette condition.

3. Vu que ces diverticules sont des prolongements de la paroi intestinale, ils determinent quand ils sont enflammés les mêmes symptômes que l'appendicite. Les complications de la diverticulité sont d'une nature plus sérieuse que celles de l'appendicite.

4. Dans l'appendicite, le traitement opératoire est impératif. Dans la diverticulité, on a actuellement recours au traitement medical en l'absence de complications. Il est de notre avis qu'on doit opérer avant la venue de complications. Il faut avoir recours au traitement chirurgical avant la survenance de la péritonite, d'abcès ou de perforation. Ce n'est que par ce procédé qu'on abaissera lo mortalité, de cette condition. L'intervention précoce évitera les procédures chirurgicales compliquées qui souvent doivent être répétées et qui donnent des résultats pas toujours satisfaisants.

RIASSUNTO

1. I diverticoli del colon rappresentano una lesione acquisita, che ha inizio neim primi decenni di vita e che aumenta rapidamente di frequenza oltre i 40 anni. La causa primitiva è la mancanza di fibre muscolari longitudinali: questa lacuna e' aggravata dall'eta', dall'obesita' e dalla stitichezza. Che i diverticoli rappresentino una lesione acquisita, cio' e' dimostrato dall'assenza di diverticoli di Meckel in tutti i casi esaminati dall'A.

2. La diagnosi piu' sicura dei diverticoli e' offerta dall'autopsia. Nei pazienti, la diagnosi e' affidata al controllo radiologico.

3. I sintomi delle diverticoliti ricopiano quelli dell'appendicite. La sede varia naturalmente a seconda della zona dei diverticoli. Le complicazioni sono, ad ogni modo, piu' gravi di quelle dell' appendicite.

4. Mentre per le appendiciti l'operazione e' il solo metodo di cura, per le diverticoliti la cura generalmente seguita e' medica, a meno che non insorgano ulterioti complicazioni. L'A. si dichiara contrario a questo metodo conservativo. Egli insiste nell' affermazione che ogni paziente affeto da diverticolite acuta del colon e' un immediato caso chirurgico, onde prevenire una possibile peritonite, una perforazione, o lo sviluppo di un ascesso. Un' operazione immediata riduce notevolmente la mortalita', mentre operazioni tardive, ripetute, conducono a risultati scadenti o molto incerti.

SUMARIO

1. El diverticulo del colon es una lesion adquirida que comienza en la segunda decada de la vida y cuya incidencia aumenta rapidamente despues de la edad de cuarenta.

La causa primaria es la ausencia de las fibras longitudinales de la capa muscular del colon y se agrava con la edad, la obesidad y el estrenimiento. En nuestra serie ninguno de los casos presento el diverticulo de Meckel, lo que en nuestra opinion es una evidencia indirecta de que lo diverticulosis del colon es una lesion adquirida.

2. La autopsia es el metodo mas seguro de diagnosticar la diverticulosis. Sin embargo en el vivo el enema con bario y contraste de aire es el mejor metodo de diagnostico de esta enfermedad.

3. Los diverticulos por el hecho de ser sacos ciegos como el apendice vermicular producen como este los mismos sintomas cuando se inflaman y la localizacion de estos sintomas depende naturalmente de la region del colon asi afectado. La diverticulitis presenta complicaciones de mayor gravedad que la apendicitis.

4. El tratamiento de la diverticulitis del colon es considerado como un problema medico y se recurre a la cirujia cuando se presentan complicaciones; pero segun el autor la cirujia deve de practicarce lo antes posible para asi evitar la peritonitis, o la perforacion.

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Patent Urachus

EUGENE J. GARVIN, M.D., F.A.C.S., F.I.C.S.
PHILADELPHIA, PENNSYLVANIA

MANY surgeons in a lifetime never see a patent urachus nor any of the variations thereof. This condition has been known to recorded literature since Cabrol in 1550 first reported a case. No doubt patients had been seen with this affliction prior to this time, but either the condition was not recognized or not recorded. From the time of Cabrol, no cases were reported until 1701, when Littré recorded a case. There were three other cases reported during the eighteenth century, 61 cases were reported during the nineteenth century and 88 during the twentieth. This makes a total of 154 cases up to the time when Herbst[5] in 1937 reported a case and so ably reviewed the literature. Up until 1936, both Wilmot and Hind reported 4 cases and in 1940 Dudgeon[4] reported a series of 7 cases. The largest series of cases was reported by Trimingham and McDonald[10] in 1945.

EMBRYOLOGIC CONSIDERATIONS

Begg[2], in his study of the anatomy, histology and development of the urachus in the human embryo, traces its derivation in common with that of the upper end of the bladder, from the ventral cloaca, the portion of the bladder in question becoming progressively narrow as it gradually develops, although all the while preserving, on a small scale, its original structure and remaining attached to the umbilicus. Shortly after birth the bladder descends, taking the urachus with it. As the bladder is pulled down, the obliterated ends of the umbilical arteries are dragged with it. Begg states that the urachus extends upward from the anterior border of the bladder usually 5 to 10 mm., below the apex of the latter for a distance of 5 to 5.5 cm. The urachus lies between the transversalis fascia and the peritoneum and is movable in its lowest part. It is a musculotendinous structure and hence aids in taking up the slack during the expansion and contraction of the bladder. Begg has demonstrated that the epithelium of the urachus persists throughout life in about two individuals out of three, its lumen being separated from that of the bladder by a thin partition of mucous membrane. In the remainder, no partition is present and the cavities communicate. Begg stated that the urachal canal is never completely obliterated and in this respect he is in agreement with Luschka. The lumen, he found, usually is tiny and may be plugged here and there with desquamated cells. In a third of his specimens, he was able to demonstrate a communication between the urachal lumen and the bladder. He was of the opinion that, although patent, the lumen of the urachus is so small that only the most minute quantities of urine can traverse it. He stated that it is lined with transitional type of epithelium.

ANOMALIES OF THE URACHUS

Vaughn[11] in 1905 described four types of anomalies of the urachus. (1) The urachus is patent throughout and is known as the complete type. (2) There is patency at the umbilical end. This is known as the blind external type. (3) Patent urachus at the vesicle end is termed the blind internal type. Any symptoms produced are similar to those of diverticulum of the bladder. (4) The ends of the urachus are closed, but there is a failure of complete obliteration of some part between the ends. This type gives rise to cyst of the urachus.

DIAGNOSIS

Diagnosis of patent urachus of the complete or fistulous type is not difficult, as the leaking of urine at the umbilicus usually is intermittent and may disappear for weeks at a time, only to reappear again. While it is draining the patient usually experiences no symptoms and suffers only from the inconvenience of wet clothing. When the fistula closes off, the patient has pain and sometimes a small mass can be palpated. In one of the cases here reported, it was very easy to pass an 18F catheter through the umbilical opening into the bladder.

In the blind external type moisture usually is present at the umbilicus and there may even be a discharge, varying in amount, and having the characteristics of urine. When the patent urachus becomes infected it is known as pyourachus.

The cysts of the urachus usually present a midline tumor of the lower abdomen, the outline of which is definitely palpable and which gives all the physical signs of encysted fluid, that is, dulness to percussion, etc. The size of these cysts may vary. Long[6] states that occasionally the cells of the lining membrane of the patent urachus secrete watery material and believes that trauma or associated general infectious processes may be regarded as activating conditions. He also states that there are cases in which the urachus communicates with the bladder through a very small opening that is intermittently occluded, especially in the presence of infection, with the intermittent escape of small amounts of fluid into the bladder and concomitant changes in the size of the cyst.

The chief symptoms caused by the urachal cyst usually are due to pressure unless infection or hemorrhage intervene. Cullen reports a case in which a urachal cyst filled the entire abdomen and contained 52 liters of fluid.

TREATMENT

The treatment of patent urachus depends upon the type of anomaly present and the degree of incapacity which is produced. Small cysts of the urachus, causing no symptoms, may be left alone although they will frequently become infected and at some future time require surgical intervention. The only satisfactory treatment for patent urachus is surgical. The completely patent urachus, exhibiting a fistulous tract, requires excision of the umbilicus and the fistulous tract down to the bladder with closure of the opening into the bladder and inversion of the stump. In infancy, it is necessary to investigate the patency of the urethra before this is attempted. (Case 2 in this series will adequately emphasize this point.)

Large cysts of the urachus require complete surgical excision. It is not always necessary in this type of case to excise the umbilicus, but care should be taken that the entire tract is dissected down and the bladder opening closed and inverted. Should a urachal cyst become infected, it is probably better to incise and drain the abscess, reserving complete extirpation of the tract for a later date. It should be remembered that the patent urachus is entirely extraperitoneal and that as long as the peritoneal cavity is not opened, there is little if any danger of peritonitis; however, in the presence of inflammation it is very difficult, if not impossible, to avoid opening the peritoneal cavity. In cases 3 and 4 of this series, where there was an infected urachus of the blind external type close to the navel and which was discharging through the navel, the author felt it advisable to extirpate the urachus completely at the time of operation, except for the base of the abscess cavity. In these two cases the navel was encircled and the urachus exposed by a midline incision through the fascia and retracting the recti muscles. The urachus was picked up below the infected cyst and dissection carried out, removing all but the base of the abscess cavity, and the noninfected portion of the urachus was dissected down to the bladder and treated in the usual manner. The midline incision was closed in layers up to the abscess cavity, just below the navel, and this portion of the tract was left open and packed with iodoform gauze, permitting it to fill in by granulation. These cases were both adequately prepared with antibiotics before surgery and it was felt safe to complete the operation by this method rather than be forced to resort to a second operative procedure.

CASE REPORTS

*Case 1.** R. McS. was a girl aged 6 years. During an attack of lobar pneumonia in January, 1938, the attending physician noticed that the child had a large periumbilical abdominal tumor. According to the mother, during an attack of pertussis in 1935 the child's abdomen became greatly distended and had never seemed to recede to its former size. As the child never complained of any abdominal pain nor of any other symptoms referable to the abdomen, no attention had been paid to the distention. Careful questioning of the mother elicited only one symptom which might have been referable to the condition, that is, marked nocturnal enuresis.

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* Cases 1 and 2 were previously reported in the Journal of Urology, v. 42, September, 1939.

Examination revealed a mass the size of a large orange, very easy to outline by palpation and definitely cystic in character. This mass was more to the right than the left and two-thirds of the cyst was located below the navel. It was freely movable within moderately confined limits.

Roentgenologic study of the stomach and intestine (small), showed no abnormality, per se, of these organs. The distribution of the small intestine pattern, however, would indicate a circular "space-taking" lesion in the midabdomen more to the right than the left, opposite the level of the third, fourth and fifth lumbar vertebrae with a diameter of approximately 8 cm. This mass was mobile as evidenced by the downward displacement of the adjacent coils of small intestine when the patient was placed in various positions. It did not hinder intestinal motility. There was a small gap noticed in the midline of the body of the fourth lumbar vertebra indicative of a spina bifida occulta. Study of the large bowel by an opaque meal revealed no gross abnormality.

Intravenous Urogram. Both kidneys were visualized at 5 and 10 minute periods. In the recumbent position the upper calices lay opposite the level of the twelfth rib left, slightly higher than the right. The left kidney was anatomically normal. The right kidney, however, showed a moderate amount of bulbous dilatation of the calices, infundibulae, pelvis and at least the upper half of the right ureter. With the patient in the erect position, we could demonstrate practically the entire right ureter.

The preoperative diagnosis, in view of roentgenographic findings, was (1) cyst of the urachus; (2) sequestration dermoid; (3) a mesenteric or omental cyst.

Operation. The child was admitted to the Misericordia Hospital of Philadelphia on May 9, 1938. The following morning, under ether anesthesia, the abdomen was opened by a right paramedian incision extending approximately 3 cm. above and 4 cm. below the umbilicus and carried down to the peritoneum. The peritoneum and the cyst wall were found to be in intimate contact and to the left of the umbilicus, they were tightly fused and impossible of separation. The cyst was freed above and about 2 square inches of the adherent peritoneum were excised. As the lowermost portion of the cyst was approached there was a definite, moderately thick pedicle which extended down toward the bladder. This pedicle was ligated and cut and the cyst delivered from the abdomen. The cyst was ruptured in delivery and a muddy, brown, greasy fluid exuded. A prophylactic appendectomy was done and 270 cc of whole citrated blood administered intravenously.

The postoperative course was uneventful and the child left the hospital on the twelfth postoperative day.

The operative diagnosis was [illegible] the urachus.

Pathologic Report. Specimen [illegible]s of a large collapsed cystic mass measuring [illegible] in diameter. The external surface is partly [illegible]th and partially rough (with a roof of [illegible]rous tissue adhesions). The wall is thick[illegible] fibrous and the lining is smooth. It cont[illegible] muddy fluid which appears to have so[illegible]ent.

Microscopic Examination [illegible]t wall shows it to be made up of very [illegible] partially hyalinized connective tissue [illegible] nothing in the histologic structure of [illegible] to indicate its origin, but the histol[illegible] is consistent with an operative [illegible] urachus cyst. The finding of what app[illegible] fatty fluid within the cyst suggested [illegible] the possibility of sebaceous origin but th[illegible] out by the histologic study.

This is a typical illustration of cyst of the urachus in which b[illegible] umbilical and the bladder opening is [illegible]. The history of the swelling following [illegible] attack of pertussis is suggestive proof [illegible] theory of general infectious processes [illegible] trauma (the cough, stimulating the lin[illegible] to the secretion of fluid. Pressure [illegible] accounts for the absence of these [illegible] after the cyst increases in size.

Case 2. Baby [illegible], male, age 2 days. Surgical consultation was [illegible] as the child was voiding entirely through the navel. Examination of the abdomen and perineum revealed:

1. A complete absence of all abdominal musculature. Peristalsis could readily be seen through the skin and the abdomen was flat and flabby, being spread far beyond the crests of the iliac bones.
2. Nonpatency of the urethra.
3. A patent urachus with the os opening in the lower end of the umbilicus.
4. There was an area about 1 inch in diameter over the symphysis pubis in which the skin was very thin and glistening and of the type which is found usually in cases of exstrophy of the bladder.

Other congenital deformities also noticed at this time were [illegible] also seemed to be a congenital deformity along the left border of the thoracic vertebrae.

Studies done 10 days later revealed the left chest normal and heart in normal position. Study of the gastrointestinal tract by means of a barium meal revealed no abnormalities.

At the time I advised waiting for a month and then injecting the urachus with an opaque medium to visualize the urinary tract.

When the child was 5 weeks old the urachus was injected with sodium iodide solution. X-rays taken after injection of the sinus tract located in the midabdomen showed two rather sharply defined shadows. The right shadow was about 5 by 2½ cm., the left about 3 by 2 cm., located in the region of the pelvis and suggesting a bifid bladder. Each of these were continuous with a dilated short tubular column of the iodide solution, which undoubtedly indicated markedly dilated ureters. There was only a suggestion of a pelvis and calices on either side entirely different, however, in appearance from a normal pelvis or calices.

This examination, therefore, revealed very marked congenital deformity of the entire urinary tract, probably including also the kidneys, which are not visible on these films.

This child was lost track of, but I understand that it died just under 1 year of age.

Case 3. H. B., male, age 39, was admitted to the Misericordia Hospital on June 25, 1947. His chief complaint was of a discharge from the navel.

The patient stated that about seven days before admission, his navel became reddened and inflamed and started to drain pus. It had been draining for the past week. Past medical and surgical history were negative.

Physical Examination. The temperature was 100.2° F., pulse rate 86, respirations 20. The remainder of the physical examination was essentially negative except for the abdomen. There was redness and swelling about the navel and for about 2 inches distal to the navel; there was a palpable tender mass. The midline of the lower abdomen was tender between the navel and the symphysis pubis. White cell count 9,000. Urinalysis: Yellow, slightly cloudy, acid, Sp. Gr. 1.020, albumin and sugar negative, urate crystals.

The patient was started on penicillin therapy on admission, 50,000 units at once, and 30,000 units every three hours.

Operation. On June 26, under ether anesthesia, a pursestring suture was placed about the navel. An incision was made, extending from below the navel almost to the symphysis pubis and circularly about the navel. On incision through the transversalis fascia a large mass of necrotic material was found in the urachus just below the navel. The navel and the roof of the urachus in this area were excised. The urachus was then picked up below the abscess cavity and dissected down into the top of the bladder where it was doubly ligated, excised and inverted. The urachus was patent throughout its entire length. The floor of the abscess cavity was then curetted and packed with iodoform gauze. The fascia was closed in the midline below the abscess cavity and the wound sutured in layers, except directly over the abscess through which the gauze protruded.

Pathologic Report. Two fibrous, reddish-brown, rubbery pieces of tissue of which the larger measures 3.2 cm. in length by 1 cm. in diameter and it tapers toward the tip. It appears to have a central lumen which is extremely narrowed. The second, a similar piece of tissue which tapers and measures 2½ cm. in length by 3 cm. in diameter. There is also a necrotic, greenish mass of tissues 1½ cm. in diameter. It is so friable it falls apart and cannot be cut.

A fourth, conical, piece of tissue consists of skin with a central round area which is raised and measures 2.3 cm. in diameter by 1.9 cm. in length. In the central area there is a catgut suture in place at the tip. On section it shows a white fibrous surface in which there is a central necrotic area.

Microscopic Examination. All the pieces submitted reveal a similar process except that in a portion of one there is stratified squamous epithelium indicative of the zone taken from around the umbilicus. The rest of the tissue is highly inflammatory and necrotic and consists of numerous polymorphonuclear leukocytes, lymphocytes, plasma cells and macrophages. Throughout the entire tract nothing can be identified except the skin margins since numerous pieces have been destroyed.

Diagnosis. Sinus extending from the umbilicus downward, compatible with remnants of a urachus.

The patient's postoperative convalescence was relatively uneventful. An indwelling catheter was placed in the bladder and permitted to remain there for the first five postoperative days. The iodoform gauze was gradually removed to permit the abscess cavity to heal gradually from the bottom, by granulation. The patient was discharged from the hospital on July 10, 1947.

This patient returned to my office on August 18, 1947. At this time, the incision was entirely healed and he had had no signs nor symptoms since surgery.

Case 4. W. B., male, age 29, was admitted to the Misericordia Hospital on Dec. 7, 1947.

The patient stated that five days previous to admission he began with pain and tenderness about the navel and that two days previous to admission he noticed discharge of pus from the navel. He stated that he remembered in childhood having had, at one time, some medication applied to the navel, but except for this he had never had any difficulties until the present time.

Medical history was negative except for the usual childhood diseases, and the surgical history was negative except for tonsillectomy and bilateral myringotomy.

Physical Examination. Temperature, pulse and respirations were normal. The physical examination was essentially negative except for redness and tenderness about the navel and a palpable mass just below the navel. There was also tenderness throughout the midline of the abdomen from the palpable mass to the symphysis pubis. Red blood cells, 4,100,000, Hg 80 per cent (12.5 Gm.), white blood cells 6,200; neutrophils, young 3 per cent, mature 68 per cent, lymphocytes 25 per cent, monocytes 3 per cent, eosinophils 1 per cent. Urinalysis: No abnormal constituents.

Operation. On admission, this patient was given penicillin, 50,000 units every four hours, and on Dec. 9, 1947, operation was performed. Under ether anesthesia, an incision was made circling the navel and carried down through the midline of the abdomen to the symphysis. The incision was carried down through the fascia about the navel and then the fascia split in the midline and the recti muscles retracted laterally. In the upper portion of the urachus through which a probe had been passed, through the sinus at the navel, there was a mass of necrotic tissue the size of a grape. This was removed and the entire mass including the navel was then freed and lifted up, leaving the base of the abscess cavity. With this mass came not only the urachus, but two lateral firm, fibrous cords, which evidently were remains of the hypogastric arteries. While there was no pulsation in these vessels, they seemed patent. The urachus was dissected down to the upper margin of the bladder where it was doubly ligated, excised and inverted. The hypogastric vessels were dissected free to the lateral side of the bladder as far as possible and doubly ligated and excised, so that the remaining specimen consisted of the navel and three long fibrous cords. The central incision was closed in layers in the midline up as far as the lower margin of the navel. The uppermost portion of the incision, where the navel had been excised, was packed with iodoform gauze.

Pathologic Report. The specimen, received in moist gauze, consisted of a piece of tissue that is funnel-shaped, comprised of skin apparently taken from the umbilicus. This portion measures 3 x 1.5 x 1 and is filled with necrotic material. Extending downward is a fibrous piece of tissue which splits in three parts, each 5.5 cm. in length and the pieces varying from 0.2 to 0.3 cm. in diameter.

Microscopically, careful examination of various levels of the structure reveals the following condition: In one of the cords there is one zone in which a lumen can be seen lined with long columnar epithelium which is stratified and well preserved and surrounded by a basement membrane. In another section there is a very small island lined by a stratified type of small epithelial cells. Other sections reveal no such process. In the lateral areas there appears to be a collapsed vessel wall compatible with an artery undergoing thickening and degeneration. This does not appear to be a completely patent and persistent urachus but simply remnants of the ducts of the type seen by Luschka, and hence called Luschka's lacunae (Joseph MacFarland, "Surgical Pathology," p. 158).

Diagnosis. Vestiges of the urachus and accompanying arteries.

This patient's postoperative course was relatively uneventful. An indwelling catheter was placed in the bladder and permitted to remain there for the first five postoperative days. Penicillin also was given for the first five postoperative days and the iodoform packing was gradually removed. The patient was discharged from the hospital on Dec. 18, 1947.

I last saw this patient on June 2, 1948. The abdominal incision was well healed and there had been no recurrence of symptoms.

SUMMARY

Briefly reviewed are the literature of patent urachus, the anatomy of patent urachus, and the types of urachal anomalies with the diagnostic features of each. Four cases of patent urachus are presented and a type of surgical procedure is described which is applicable to the blind external type of patent urachus and which has proved successful in my hands. It [illegible] suggested [illegible] this type of surgical pro- [illegible] oul[illegible] [illegible] only where a necrotic

mass is present in the urachus, and which ordinarily would necessitate two surgical procedures.

SOMMAIRE

Cet article présente une brève revue de l'anatomie de l'urachus non occlus et des différentes anomalies urachales et aussi le diagnostic de chacune de ces infirmités.

Quatre case d'urachus permanent sont présentés et discutés.

L'auteur nous présente aussi une procédure chirurgicale applicable aux types externes des urachus persistants. Cette méthode lui a donné de bons résultats. L'auteur a l'impression que ce procéde, et les méthodes apparenteés ne doivent etre employés que dans les cas où il y a une masse nécrotique dans l'urachus, qui ordinairement exigerait deux intervention opératoire.

SUMARIO

Se ha hecho una revista de la anatomia del uraco patente y de las caracteristicas diagnosticas de los diferentes tipos de anomalies del uraco y se han presentado cuatro casos clinicos de uraco patente. Tambien se ha precentado una tecnica operatoria aplicable a los casos de uraco patente cuyo orificio externo es ciego. Sin embargo esta tecnica se debe de usar solamente en los casos complicados por la necrosis y que ordinariamente requeririan dos intervenciones quirurgicas.

RIASSUNTO

Riassume le varieta' anatomiche e le caratteristiche diagnostiche delle anomalie dell' uraco in base all'osservazione di quattro casi di mancata obliterazione. Propone un nuovo metodo di operazione applicabile ai casi in cui l'uraco e' esternamente cieco: l'intervento ha condotto a buoni risultati in tutti i casi così operati. L'operazione trova un' indicazione solamente nei casi in cui l'uraco contiene una massa necrotica: con gli altri metodi operatori occorrerebbero infatti due successivi interventi.

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Massive Hemorrhage from Meckel's Diverticulum

H. O. FOUCAR, M.D., F.I.C.S.
LONDON, ONTARIO

THERE are few structures which present as many anomalies or interesting clinical entities as does the vitelline duct. This duct is the communication between the intestine and the yolk sac. The yolk sac reaches its maximum size in the earlier part of the fourth week of intrauterine life. In the sixth week the vitello-intestinal duct extends within the umbilical cord from the yolk sac to the apex of a U-shaped loop of midgut. During the sixth week this duct normally becomes occluded from the outer end toward the intestine and disappears completely (Keith).

The entire duct may persist as an intestinal fistula, opening at the umbilicus. The outer end only may persist as a diverticulum, which may become everted, presenting as a raspberrylike mass at the umbilicus, known as entero-teratoma. It is covered by columnar epithelium which differentiates the lesion from a granuloma. The two ends may be obliterated and the central portion, lined by columnar epithelium, then becomes distended, forming a cyst (enterocystoma), or this cyst may become displaced against and included in the mesentery (enterogenic mesenteric cyst) When only the inner end persists, an intestinal diverticulum remains which was first described by Meckel in 1816.

The lumen of the duct may be obliterated entirely leaving a solid fibrous band extending from the umbilicus to the free side of the small intestine, or the duct may be partly obliterated, resulting in a terminal ligament attached to the end of a Meckel diverticulum. The midportion sometimes disappears leaving a diverticulum at each end. This may also be associated with a band from the umbilicus to the mesentery, the remains of the omphalomesenteric vessels (Somerville-Lange and Nagle).

At times the duct may disappear completely but leave a narrowing of the ileum at its site of origin.

Meckel's diverticulum is present in about 2 per cent of individuals and occurs on the antimesenteric side of the ileum two to three feet from the ileocecal valve. Usually it measures 2 inches in length, but may be shorter or longer. It may be globular or cylindrical in shape and the end may be bulbous, cylindrical or conical. It may be free or a terminal ligament may be present. A mesentery may also be noted in some cases.

It may occur in a hernial sac in which case the term "Littré's hernia" is applied. The diverticulum may form the head of an intussusception and will be recognized at operation after reduction. Acute obstruction may be due to the diverticulum becoming knotted around a loop of intestine (Dorling). Loops may also be snared in the vicinity of an adherent Meckel's diverticulum or around obliterated bands or a volvulus of the intestine may occur around the axis of a relatively fixed diverticulum.

Degrees of infection have been described, varying from simple catarrhal forms to acute diverticulitis and even gangrenous states, resulting in perforation, abscess formation and peritonitis. Bile-stained peritoneal exudate seen after laparotomy may be the clue pointing to perforation in this region. Tuberculosis and typhoid lesions have been observed.

Tumors have been found. Schullinger and Stout reported an adenoma. Nygaard and Walters referred to the benign tumors (myoma, lipoma, carcinoid tumors, neuroma and papilloma) and studied especially the malignant tumors. They collected 6 cases of carcinoma and 12 cases of sarcoma from the literature and added two cases of leiomyosarcoma.

Ectopic tissue has been demonstrated microscopically. Farr and Penke found gastric mucosa reported in 6 out of 13 Meckel's diverticula. Schaetz found normal ileal mucosa in 17 out of 30 specimens. In the remaining 13 he found gastric mucosa in 5, jejunal tissue in 3, pancreatic tissue in 3, carcinoid tissue and peritoneal epithelium in one each.

It is interesting to note that in those cases where gastric mucosa is present, ulceration, hemorrhage or perforation (peptic ulcer) may occur due to erosion of the intestinal mucosa in the neighborhood.

Hemorrhage per rectum occurs from ulceration of Meckel's diverticulum often enough *so that it must always be considered in the* differential diagnosis of an obscure case of intestinal bleeding, especially in children. Little has reported 5 such cases from six months to two and a half years. Four were diagnosed as intussusception and one as bleeding Meckel's diverticulum.

The case now presented is another example of correct diagnosis and successful operation.

CASE REPORT

J. S., a girl five years of age, was admitted to the War Memorial Children's Hospital under Dr. H. S. Little on Oct. 27, 1945, because of massive hemorrhage per rectum.

She was born with a complete single harelip and cleft palate which were repaired by the author in 1941 and 1942 respectively. At two months of age she passed approximately half a cup of blood per rectum. This stopped promptly and no further treatment was given. At one and a half years of age she had whooping cough. In June, 1945, she contracted measles complicated by otitis media and her convalescence was slow. Three weeks before admission she was vaccinated against smallpox. This was followed by a febrile reaction for one week. Eight days before admission she complained of epigastric distress. Five days later she passed loose, black, bloody stools. On the following day she vomited repeatedly. Then the vomiting stopped and she passed several more loose bloody stools for two days. She was admitted to hospital at 11:15 p.m. Oct. 27, 1945, white and almost pulseless. Her hemoglobin was reported as 8 per cent and later as 15 per cent. She was still passing blood by bowel and there was some epigastric tenderness. She was given 840 cc. of whole blood. The bleeding stopped and she seemed improved. On the next afternoon her condition became worse. A diagnosis of massive hemorrhage from Meckel's diverticulum was made and operation was advised. A transfusion of 500 cc. of whole blood was administered immediately before operation and a second transfusion of 500 cc. of blood during and after the operation.

Under cyclopropane and oxygen anesthesia a right paramedian incision was made. At once it was noted that the lower part of the ileum contained blood. The small intestine was followed proximally until Meckel's diverticulum was located. It was 1 inch long and ¾ inch in diameter, was edematous and showed evidence of hemorrhage. No blood was visible proximal to the diverticulum. Two V-shaped incisions were made at the base of the diverticulum, the specimen was removed and the opening was closed transversely with intestinal catgut. The abdomen was closed in layers with chromic catgut and dermal.

Pathology. The mucosal layer is almost entirely of the intestinal type but at one point there is a transition to gastric mucosa. In this area the glandular structures are composed of cells of the acidophilic type and they show a single layer of chief cells with here and there an occasional parietal cell. Close to this island of gastric mucosa there is a point of rather superficial ulceration, the base of the ulcer being made up of necrotic debris and being infiltrated with numbers of polymorphonuclear leukocytes. The ulcer occurs in the intestinal mucosa. The musculature of the diverticulum contains occasional eosinophils.

The patient was returned to her room conscious, without pain and of good color. Her temperature was 101° F. for the first day, dropping to normal and her pulse 100 dropping to 80. She passed dark stools until Nov. 1, 1945. On Oct. 28, 1945, after the operation the blood count was as follows: hemoglobin 50 per cent, red blood cells 2,390,000, color index 0.94, white blood cells 10,100, neutrophiles 62 (mature forms 50, young 12), lymphocytes 34 and monocytes 4. On October 30 her hemoglobin was 70 per cent, red blood cells 3,860,000, color index 0.82, white blood cells 6,400, neutrophiles 79 (mature forms 75, young 4), lymphocytes 20 and basophiles one.

She was allowed up on November 4, the stitches were removed on November 8, and she was dismissed on Nov. 9, 1945, after an uneventful convalescence.

SUMMARY

1. A case of massive hemorrhage from a Meckel diverticulum with ectopic gastric

mucosa is reported with a successful operation and uneventful convalescence.

2. Repeated blood transfusions (1,840 cc.) contributed to prompt recovery.

3. This clinical entity, while rare, occurs often enough to be considered in the differential diagnosis of all obscure cases of intestinal bleeding, especially in children.

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Sección en Español

Desnervación Pancreática y Pancreatomentopexia en la Diabetes Mellitus*

FRANCISCO FONSECA, M.D., Y
MANUEL A. MANZANILLA, M.D., F.I.C.S. (HON.)†
MÉXICO, D. F. MÉXICO

DESDE hace algún tiempo se trata de resolver quirúrgicamente la terapéutica de la diabetes mellitus y cada ensayo es un avance. Se ha dicho que el problema es quirúrgico y así lo hemos expresado en diversas comunicaciones y lecciones desde 1940. Se entiende que la conducta quirúrgica debe fundarse fisiológicamente.

La hiperglucemia es el hecho capital y en la regulación de la glucemia intervenal dos fenómenos fundamentales: la liberación de la glucosa, principalmente por el hígado, determinada por la adrenalina circulante; la utilización de la glucosa, determinada por la insulina circulante.

La hiperglucemia ocurrirá cuando los factores hormonales diabetogénicos aumenten, quedando excluídas las hiperglucemias fisiológicas, determinadas por la digestión, emociones o estados de emergencia. Deben señalarse como factores diabetogénicos de básica importancia los debidos a la influencia hormonal diabetogénica de la anterohipófisis, el tiroides, las suprarrenales y las gonadas.

La anterohipófisis actúa como antagonista de la acción insulínica. Se cree, por otra parte, que sensibiliza el glucógeno hepático a la adrenalina. Asimismo, se piensa que obra excitando la medular suprarrenal por vía diencefálica simpática.

Experimentalmente se sabe que la influencia diabetogénica del tiroides puede producir lesiones de los islotes de Langerhans, e hiperglucemia por aumento de la secreción adrenalínica.

La cortical suprarrenal, como la anterohipófisis, actúa también como antagonista de la acción insulínica. Además, la medular suprarrenal por su secreción adrenalínica aumenta la glucemia, en virtud de su acción glucoliberadora. Ahora bien, reviste gran importancia saber si la secreción de adrenalina es contínua o solamente tiene lugar en estados de emergencia, lo que ha sido motivo de discusión durante mucho tiempo. Hay motivos para pensar que sea contínua, si se invoca la observación experimental de Cannon, quien en simpaticectomías totales observó descenso metabólico. Asimismo, hemos observado por el estudio de las curvas glucémicas, después de la sección funcional esplácnica por alcoholización o la quirúrgica, descenso glucémico que indica desde luego interrupción de la secreción adrenalínica.

En lo que atañe a las gonadas, según investigaciones de 1947, llevadas a cabo experimentalmente en ratas, se ha señalado la influencia de las glándulas y hormonas a este respecto.

Con estos datos compendiosos, sin profundizar en los problemas tan complejos que la fisiopatología plantea, se puede fundar la acción quirúrgica con fines terapéuticos y la crítica consiguiente. Los ensayos de tratamiento quirúrgico en la diabetes mellitus los consideramos así:

1. Los que tienden a reforzar la acción funcional del sistema neuroendócrino vagopancreático hipoglucemiante.
2. Los que tienden a reprimir la acción funcional del sistema neuroendócrino suprarrenoesplácnica hiperglucemiante.
3. Los que tienden a la regulación endócrina hipofisiaria.

Al primer grupo pertenecen las intervenciones siguientes:

A. El injerto pancreático, cuyos resultados experimentales han sido poco satisfactorios y no ha sido realizado aún en el hombre.

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† Catedráticos de la Facultad de Medicina de México.

B. La ligadura de los canales excretores del páncreas, tendiendo a transformar al órgano en una glándula solamente endócrina por alteración de la función externa, que no ha dado en el hombre los resultados favorables que en los animales y que puede considerarse como ineficaz y peligrosa.

C. La simpaticectomía de las arterias pancreáticas, que ha dado experimentalmente resultados satisfactorios, pero que por su dificultad técnica no ha sido posible efectuar en el hombre.

D. La operación de Jentzer, que asocia la simpaticectomía pancreática a la implantación vagal y epiploica pancreática.

Al segundo grupo pertenecen las intervenciones sobre las suprarrenales y los nervios espláenicos, a saber:

A. La suprarrenalestomía, que puede ser total o parcial unilateral o parcial bilateral y tiene aspectos mixtos con el tercer grupo.

B. La medulectomía suprarrenal, de difícil realización técnica por lo friable de la glándula.

C. La desnervación suprarrenal, yuxtaglandular o por sección espláenica.

El tercer grupo comprende: la hipofisiectomía, que se ha tratado substituir funcionalmente con la irradiación hipofisiaria, y la acción quirúrgica tiroidea.

Además, podemos citar accesoriamente la ligadura de los conductos excretores de las glándulas salivales, que ha producido experimentalmente la observación de hipoglucemia.

PROCEDIMIENTO QUIRURGICO

Nos ocuparemos esta vez de la acción quirúrgica por desnervación pancreática y pancreatomentopexia, modificación a la técnica operatoria de Jentzer por supresión de la implantación vagal. Consiste en efectuar laparotomía paramediana izquierda supraumbilical y abordar el páncreas a través de una brecha en el epiplón gastrocólico, practicando entonces la desnervación yuxtaglandular por excisión de la mayor parte de la cápsula que sea posible, fijando a continuación una pequeña porción del epiplón mayor a la cara anterior del páncreas, por medio de puntos separados superficiales con hilo inabsorbible (algodón o nylon). Después se sutura la brecha del epiplón gastrocólico y se hace la reconstitución de la pared abdominal, con hilo inabsorbible también.

RESULTADOS OPERATORIOS

Cinco casos integran la estadística actual, habiendo sido observados por ahora hasta por tres meses después de la intervención quirúrgica, no habiéndose seguido régimen dietético especial. A este respecto, debemos mencionar al Prof. Dr. Edmundo Henríquez por su importante contribución científica, en el estudio clínico y la observación continuada de los citados casos, de los que citaremos dos sumamente interesantes, especialmente por la gran poliuria que presentaron y la interpretación que damos a los resultados obtenidos sobre la misma.

Caso 1. Sexo masculino, 38 años de edad, diabetes grave con pérdida de tres kilogramos de peso en un mes; polifagia y polidipsia intensas; poliuria de diez litros en 24 horas; glucosuria de 40 gramos por 1000 cc. glucemia de 300 miligramos por 100 cc.; 100 unidades de insulina diarias, con difícil descenso de 50% en la glucemia y glucosuria señaladas. Tres meses después de operado presenta: aumento de cinco kilogramos de peso; desaparición de polifagia y polidipsia; poliuria de cuatro litros en 24 horas, 60% menos de la cifra inicial; 90% de disminución de la glucosuria y 40% de la glucemia.

Caso 2. Sexo masculino, 22 años de edad, diabetes juvenil grave con pérdida de doce kilogramos de peso en un mes; polifagia y polidipsia intensas; poliuria de diez y ocho a veinte litros en 24 horas; glucosuria de 33 gramos por 1000 cc.; glucemia de 300 a 350 miligramos por 100 cc.; 150 unidades de insulina diarias. Tres meses después de operado presenta: aumento de ocho kilogramos de peso; disminución de polifagia y polidipsia; 80% de disminución de la poliuria y de la glucosuria; 50% de disminución de la glucemia; 40 unidades de insulina diarias.

Del estudio de los cinco casos operados se destaca lo siguiente:

1. Desaparición o notable disminución de la polifagia, la polidipsia y la poliuria.
2. 80 a 90% de disminución en la poliuria.
3. 30 a 50% de disminución en la glucemia.
4. 60 a 90% de disminución en la glucosuria.

5. 75% de reducción en la dosis de insulina preoperatoria.

DISCUSIÓN

Sabemos experimentalmente que las células beta de los islotes de Langerhans son las células productoras de insulina. Ahora bien, no existen dudas de que la cifra de glucemia actúa excitando directamente el tejido de islote, con mayor intensidad cuanto mayor es dicha cifra. Lógico es que cualquier procedimiento quirúrgico que tienda a aumentar la circulación pancreática, bien sea directa o indirectamente por la simpaticectomía, determinará indudablemente mayor aflujo sanguíneo, condiciones de nutrición mejores y estímulo de mayor intensidad para la producción de insulina por las células beta.

Jentzer preconiza, como hemos mencionado, la simpaticectomía pancreática, seguida de la implantación pancreático del epiplón y la del vago. Consideramos que la conducta quirúrgica con la modificación señalada está más de acuerdo con los conocimientos fisiopatológicos, dado que para implantar el vago en el páncreas y para obtener un verdadero injerto se necesita un hecho fundamental, la existencia de fibras colinérgicas seccionadas sobre las cuales fuera a implantarse el vago, pero esto es sumamente difícil en las condiciones de la intervención, por no decir imposible. Así pues, la conducta de suprimir la implantación del vago nos parece razonable, además de disminuir el traumatismo operatorio. La implantación del epiplón aumenta teóricamente el aflujo sanguíneo, además de las condiciones de mayor irrigación sanguínea derivadas de la simpaticectomía por descapsulación parcial.

Los fisiólogos han observado fenómenos que denominan sensibilización de los efectores, ya que después de la simpaticectomía el efector da mayor respuesta que normalmente a un estímulo dado; este fenómeno se atribuye a la mayor permeabilidad del efector simpaticectomizado a la adrenâlina. La sensibilización se presenta en las secciones preganglionares y postganglionares, habiéndose comprobado que as más intensa en las postganglionares; esto ha hecho que Smithwick y White preconizen que, de ser posible, en toda simpaticectomía se intervenga en las fibras antes de la sinapsis. Debemos señalar que la desnervación suprarrenal, o en su caso la esplacnicectomía, es la única conducta quirúrgica de simpaticectomía preganglionar, dado que no hay fibras postganglionares sino tejido cromafín de la suprarrenal.

¿Qué ventajas y desventajas, desde el punto de vista de la especulación pura y de los conocimientos fisiopatológicos, puede tener la conducta quirúrgica que nos ocupa? En pro tenemos la mayor irrigación pancreática y por lo tanto el mayor suministro de glucosa, que va a servir como estímulo a la secreción insulínica por las células beta; el hecho de que se produce mayor cantidad de insulina de la que hasta el momento existía es irrefutable, como lo indica la disminución del 30 al 50% de la glucemia en los casos operados. En contra tenemos la posibilidad de que la mayor excitación de las células beta, bien en tratándose de un proceso de orden destructivo o de hipofunción, pudiera producir hiperplasia a la que podría seguir fatiga y hasta lesión consecutiva, tenida cuenta de lo que ocurre esperimentalmente en los animales pancreatectomizados parcialmente.

Volviendo a lo expuesto sobre la llamada sensibilización de los efectores, cabe presumir en la conducta quirúrgica que nos ocupa, que podría ocurrir con ella mayor sensibilización, dado su carácter de sección postganglionar. Además, siendo la descapsulación parcial quedan efectores no desnervados, en cuyas terminaciones nerviosas se produce simpatina, que al actuar sobre las zonas sensibilizadas produce mayor vasoconstricción.

Es indudable que el aumento de la excitación glucémica sobre las células beta determina la mejoría clínica de los casos operados, como puede apreciarse por la disminución de 80 a 90% en la poliuria, de 30 a 50% en la glucemia, de 60 a 90% en la glucosuria como consecuencia de la disminución glucémia, así como menor cantidad de insulina parenteral, 75% de la cifra preoperatoria, para mantener al enfermo como normalmente.

Los resultados apuntados son notables en lo que atañe a la poliuria, pues acusan disminución de 80 a 90% de la inicial. Cabe entonces preguntar ¿cuál es el mecanismo de esta disminución? Hay que descartar una observación que podría ser primordial pero que es muy difícil verificar. Si el enfermo ingiere menos agua el volumen de orina tiene que ser menor, pero desde el punto de vista clínico es muy difícil saber que es primero, si la disminución de la ingestión de líquido o la disminución de la poliuria. Queda un factor importante que examinaremos desde luego.

Sabemos que, en el riñón, el segmento proximal del tubo de Henle efectúa la reabsorción de la glucosa. Asimismo, sabemos que en la diabetes, debido a la hiperglucemia, no se reabsorbe totalmente la glucosa, quedando en la orina un remanente que requiere cierto mínimo de agua para poder ser eliminado, según el volumen obligatorio de Ambard. Esta cantidad de agua, indispensable para la eliminación de la glucosa, debe ser probablemente la expresión de la poliuria. Si tenemos en cuenta esto, es lógico pensar que, disminuyendo la glucemia, disminuye la poliuria por el mecanismo invocado. Esta es en nuestro concepto la interpretación adecuada.

Por último, aun cuando de los resultados expuestos no puedan derivarse de inmediato conclusiones definitivas, aquellos permiten aumentar la experiencia necesaria para la consecución de estas.

RESUMEN

Se trata de la acción quirúrgica por desnervación pancreática y pancreatomentopexia en la diabetes mellitus, con modificación a la técnica operatoria de Jentzer por supresión de la implantación vagal, lo que se considera más de acuerdo con los conocimientos fisiopatológicos. Se consignan resultados operatorios y se discuten, desde el punto de vista de la especulación pura y de los conocimientos fisiopatológicos, las ventajas y desventajas que puede tener la conducta quirúrgica de que se ocupan los autores.

Editorials

World Medical Association

THE World Medical Association was organized in Paris in September, 1947. The Association has its headquarters and Secretariat at the New York Academy of Medicine, New York City. Its objectives are:

1. To promote closer ties among the national medical organizations and among the doctors of the world by personal contact and all other means available.
2. To maintain the honor and protect the interests of the medical profession.
3. To study and report on the professional problems which confront the medical profession in the different countries.
4. To organize an exchange of information on matters of interest to the medical profession.
5. To establish relations with, and to present the views of, the medical profession to the World Health Organization, UNESCO and other appropriate bodies.
6. To assist all peoples of the world to attain the highest possible level of health.
7. To promote world peace.

The Association is conducting a series of investigations into various aspects of medical practice in the different countries of the world. These include, among other things, the status of the medical profession, the standards of medical education, cult practice, nostrums, postgraduate medical education, training of specialists, war crimes, and the matter of establishing an international code of ethics.

A bulletin, probably quarterly, will be published by the Association, for the purpose of disseminating the information compiled from the studies carried out, and reports of the meetings of the General Assembly.

At present 26 national medical associations are members of the World Medical Association. Seven more have been approved for election by the Council and still others are under consideration.

In order that the organization may become a truly effective one in promoting world medicine, world health, and world peace, funds are necessary. Because of the financial situation in many countries, together with the difficulty in transferring funds out of most countries, it was decided to organize a United States Committee in support of the World Medical Association. National and local medical organizations, organizations allied to and serving medicine; other organizations; physicians and other individuals are invited to become Founder and Sustaining members of the United States Committee.

The International College of Surgeons has become a member of this Committee. Other medical organizations which have joined are the American Medical Association and the Mayo Clinic. The American Red Cross and the National Foundation for Infantile Paralysis, as well as many industrial organizations, likewise are members.

Members of this Committee will receive all publications and releases of the World Medical Association. They will also play a part in improving the status of medicine and public health throughout the world. The success of the World Medical Association also will play a definite part in promoting better international relations.

Those interested should apply to the Secretary, World Medical Association, United States Committee, Inc., 2 East 103 Street, New York 29, New York.

E. L. HENDERSON

Sphincter Preservation in Operation for Carcinoma of the Rectosigmoid

WHATEVER position one may take regarding the question of radical removal of carcinoma of the rectum and/or rectosigmoid with reference to the preservation or sacrifice of the sphincter, it is important not by frantic effort to persist exclusively in the old operations with sacrifice of the sphincter. Rather, the question of sphincter preservation should be decided by an open mind upon the basis of available fact. It is also important that the question at issue be not confused with the effort to carry out these necessarily radical, and therefore large, operations by the abdominal route alone—the so-called anterior operation.

Effort to preserve the sphincter has occupied the mind of many of the best surgeons both here and abroad for many years. The disabilities that have accompanied the early attempts were necessarily inherent in the problem, but have fortunately been removed in very large part by the development of chemotherapy and antibiotic therapy, and by the increase in our operative abilities and experience. There is no doubt that with the help of these factors one enters an abdomen nowadays with a courageous confidence that was not present in years gone by, and one does things which previously had been fraught with much misgiving on our part and with excessive danger to the patient. The problem now concerns itself, essentially, (1) with the feasibility and practicability of preserving the sphincter as determined by the paths of growth and spread of the malignancy; and (2) with the superiority of this form of operation as measured (a) by the immediate mortality, (b) by the character of the wound healing and the general convalescence, (c) by the frequency and character of any immediate or late complications, (d) by the frequency of local recurrences and distant metastases, and (e) by the permanent results.

These are the hard-boiled practical criteria upon which this question necessarily must be decided. Nevertheless, the social and psychosomatic aspects of a permanent artificial anus are factors which may not lightly be disregarded in all cases. What may be of only slight importance to one, may have a profound effect upon the nervous and emotional system of another. It is wrong to assume that this new mechanism, uncontrollable in action and unpredictable in time may be dismissed lightly from the mind of many patients.

In the light of present experience older ideas regarding the spread of a malignancy of the rectum need modification. One no longer considers mainly the spread of the growth in the long axis of the bowel or of the body. With tumors arising above the line of embryologic union between anus and rectum proper, and with those in the latter position which have not spread by local contiguous growth into the anal canal, it is now accepted that for clinical purposes downward extension of the growth may practically be disregarded. The important item that engages us now is the growth through the thickness of the bowel wall into the perirectal fatty connective tissue and from thence into the lymphatics and lymph nodes leading upward into the abdominal cavity. Penetration through the peritoneal coat of the rectal wall leads to the local recurrences and the spread thence into the lymphatics and lymph nodes leads to the distant metastases. In the best series of statistics such penetration and local spread is already present in from one-half to two-thirds of the cases at the time of primary exploration. When present, this condition becomes an equal disability, no matter what method of operation is employed and whether or not the sphincter is preserved or sacrificed.

All of the criteria upon which decisions must be made regarding the operability of any given case are independent of the path of approach and of the question of preserving the sphincter and remain as always according to the tried traditions and practice of successful surgery.

In the last analysis the possibility of preserving the sphincter is entirely dependent upon the physical situation of the growth with respect to the anal sphincter. When the lower margin of the growth is at least 3 inches from the latter, it is technically feasible to remove the malignancy radically and preserve the sphincter no matter what path of approach—abdominal, posterior, and/or combined—is employed. With modern methods and technic, a one-stage straightforward resection of the tumor-bearing segment with immediate end-to-end, two or three layer, circular suture seems by all accounts, and in my own experience, the best method of operation in nonobstructive cases and is much superior to the pull-through and other plastic methods of restoration of the sphincter function. The present tendency is to do all of this in one stage in the nonobstructive cases without regard to the method of approach and without simultaneous colostomy.

The published statistics indicate that the resectability (operability) rate varies in various hands from 35 to 80 per cent. The wide difference in these figures must correspond to personal factors which undoubtedly include a certain amount of error and some lack of experience.

The literature indicates that with preservation of the sphincter the average mortality rates vary from a low of 3.4 per cent (Dixon,[1] recent figures) to a high of 8.9 per cent (Coller and Ransom[2]). Other series show mortalities from 12 to 21 per cent. The literature indicates that with preservation of the sphincter, the average mortality rate is no higher than when the latter is sacrificed and, remarkably, it is noted that frequently the mortality is less (Mandl[3]).

The postoperative course is not unduly prolonged. There are few extraordinary immediate postoperative complications, and no difference in the degree of any bladder dysfunction. Curiously enough, the percentage of any subsequent impotence in the male seems much less in the cases with sphincter preservation. There are no extraordinary late surgical or other complications and no increase beyond their usual frequency.

With the modern end-to-end circular suture method of preservation of the anatomic sphincter, bowel function is perfect in all cases when healing is completed. In the methods of restoration of the sphincter function (pull-through operations, and/or other plastic procedures), incontinence results and/or follows with more or less completeness in from 50 to 75 per cent of the cases. In the past this has undoubtedly been one of the deterrent factors for the preservation of the sphincter.

Without node involvement local recurrences occur in 4.6 per cent of the cases, and with node involvement in 23.2 per cent (Gilchrist and David[4]). Without this differentiation *the series of D'Allaines and Vernejoul[5] show* 17.8 per cent recurrences after resection and 25 per cent after complete proctectomy. My own cases show an equal rate of 5.5 per cent in either case. When operation is done from the abdominal route exclusively (anterior resections), and the individual case is badly selected, the rate of local recurrence is somewhat higher. When there is lymph node involvement, the rate of local recurrence rises abruptly. In any case, local recurrence occurs equally and seems independent of the method of approach and does not seem to be materially different in series of cases with or without preservation of the sphincter.

The five- and ten-year survival rates in the reported series of cases vary from 51.8 per cent without node involvement to 23 per cent with node involvement (Colcock[6]). Most of the series do not make this differentiation and then the survival rate varies from 26 per cent (Wilensky) to 38 per cent (Babcock and Bacon[7]).

At the present writing, the survival rate with sacrifice of the sphincter is superior only when there is no extramural spread of the malignancy and when the lymph nodes are not involved with tumor growth. This is, of course, true with all forms of operation. Otherwise the reported survival rates show a balance remarkably in favor of operation with preservation of the sphincter (Mandl series[5] and Finsterer series[8], approximately 30 per cent more; Wilensky series[9] about 50 per cent more).

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[2] Coller, F. A., and Ransom, H. K.: Surg., Gynec. & Obst. 78 :304, 1944.

[3] Mandl, F.: Ueber 1000 sakrale Mastdarmkrebse Exstirpationen. Deut. Ztschr. f. Chir. 219 :3, 1929. Maintenance of Continence in Operation for Carcinoma of the Rectum, J. Internat. Coll. Surg. 3 :11, 1940.

[4] Gilchrist, R. K., and David, V. C.: A Consideration of Pathological Factors Influencing Five Year Survival in Radical Resection of the Large Bowel and Rectum for Carcinoma, Ann. Surg. 126 :421, 1947.

[5] D'Allaines, F., and Vernejoul, R.: Conservation of Sphincter Function in Operative Treatment of Rectal Carcinoma, J. de chir. 62 :274, 1946; Internat. Abst. Surg. 84 :554, 1947.

[6] Colcock: In discussion of paper of Gilchrist and David, ref. 4.

[7] Babcock, W. W., and Bacon, H. E.: Arch. Surg. 46 :253, 1943.

It seems fair to say that modern sphincter preservation is in the early stages of development. The individual series of cases are still very small and do not yet approach the magnitude of earlier series of cases in which the older types of operation were practiced and in which the sphincter was routinely sacrificed. It seems also fair to assume that the results of operation with sphincter preservation will continually improve with further more extended experience as have other types of operation under modern conditions.

Nevertheless, nothing in these remarks must be interpreted to mean that every case which comes is suitable for preservation of the sphincter and must be operated upon with that purpose in view. There should always be free discriminatory choice. There are cases which must be operated upon by the [illegible] and simplest method because of other extraneous general factors. There are cases which are best served entirely from below; others which are best served (but only in very well selected cases) from above, and still others in which only a combined abdominoposterior approach is satisfactory. There are cases in which preservation of the sphincter can not be considered at all. Every case must be decided upon its own merits. Nevertheless, the conclusion is well founded that, other things being equal, the sphincter should be preserved whenever possible.

A. O. WILENSKY

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8. Finsterer: Quoted by [illegible] Vernejoul, ref. 5.
9. Wilensky, A. O. Retention [illegible] Sphincter in the Radical Operation for Carcinoma [illegible] Rectum. New York State J. M. 42: 1150 [illegible] Experience with Carcinoma of the [illegible] Rectum in Private Practice, J. Intern [illegible] 1948.

Preliminary Program
Thirteenth Annual Assembly, United States Chapter International College of Surgeons
St. Louis, Missouri, Nov. 16-19, 1948

Sunday, November 14:

9:00 A.M.: Registration, Kiel Auditorium.

9:00 A.M.: Meeting of Executive Council, United States Chapter, Jefferson Hotel.

2:30 P.M. Meeting of House of Delegates, United States Chapter.

Monday, November 15:

8:30 A.M.: Registration, Kiel Auditorium.

8:00 A.M.–5:00 P.M.: Operative Surgical Clinics, St. Louis Hospitals. Clinics will be posted later.

E. Vernon Mastin, M.D., Chairman.

Tuesday, November 16:

8:30 A.M.: Registration, Kiel Auditorium.

8:30 A.M.: Exhibits open, Kiel Auditorium. Scientific Program Opens.

R. M. Klemme, M.D., Chairman.

Tuesday, November 16: Partial List of Presentations:

Winchell Craig, M.D., Rochester, Minn.
T. C. Davidson, M.D., and A. H. Letton, M.D., Atlanta
Claude Hunt, M.D., Kansas City
Lowrain McCrea, M.D., Rochester, Minn.
Raymond W. McNealy, M.D., Chicago
Louis J. Plzak, M.D., Chicago
Stephen A. Zieman, M.D., Mobile

8:00 P.M.: St. Louis Medical Society and International College of Surgeons, St. Louis Medical Society Auditorium, Round Table Symposium, "Carcinoma of the Rectum with Metastases":

Harry E. Bacon, M.D., Philadelphia
W. Wayne Babcock, M.D., Philadelphia
Claude Dixon, M.D., Rochester, Minn.

Wednesday November 17:

8:40 A.M.–5:30 P.M.: Scientific Program: Partial List of Presentations:

Albert Behrend, M.D., Philadelphia
Moses Behrend, M.D., Philadelphia
James Barrett Brown, M.D., St. Louis
Prof. Bruni, M.D., Rome, Italy
Prof. Francisco Graña, M.D., Lima
Claude C. Kennedy, M.D., Minneapolis
W. R. Lovelace, M.D., Albuquerque
Leslie C. Oliver, M.D., London
Philip Thorek, M.D., Chicago
George Shambaugh, M.D., Chicago.

8:00 P.M. Entertainment for International College of Surgeons and Ladies, Kiel Opera House.

Thursday, November 18:

8:40 A.M.–5:30 P.M.: Scientific Program: Partial List of Presentations:

Charles Arnold M.D., Chengtu, West China
James Brailsford, M.D., London
Prof. A. Mario Dogliotti, M.D., Turin
Morris Friedell, M.D., Chicago
Rudolph Jaeger, M.D., Philadelphia
Frank McDowell, M.D., St. Louis
Manuel Tuason, M.D., Manila

8:00 P.M.: Banquet, Gold Room, Jefferson Hotel. Dress optional, dinner coat preferred.

Friday, November 19:

8:40 A.M.–4:00 P.M.: Scientific Program: Partial List of Presentations:

Custis Lee Hall, M.D., Washington, D. C.
Francis Lederer, M.D., Urbana, Ill.
D. J. Leithauser, M.D., Detroit

7:30 P.M.: Convocation, Opera House, Kiel Auditorium.

E. Vernon Mastin, M.D., Chairman

Saturday, November 20:

8:00 A.M.–12:00 Noon: Operative Surgical Clinics, St. Louis Hospitals.

E. Vernon Mastin, M.D., Chairman

For full information write to Dr. Roland M. Klemme, Chairman, 4952 Maryland Ave., St. Louis, or Dr. E. Vernon Mastin, Co-Chairman, 3720 Washington Blvd., St. Louis.

The final complete program will be published in a subsequent issue of the JOURNAL.

Abstracts from Current Literature

Leiomyoma of the Small Intestine, G. Goldstein and J. Tugenreich, Acta med. Orientalia, 6:361, Nov. 1947. A case is reported of leiomyoma involving the jejunum in which the patient suffered recurrent attacks of melena since 1941 and which presented diagnostic difficulties. In 1943, on suppositious diagnosis of gastric ulcer, a partial gastric resection was performed, with no change in symptoms which continued to recur. In 1947 a roentgenographic study was made. Passage of the contrast medium continued normally until it reached the jejunum. At the height of the left iliac bone a jejunal loop formed a circle around a palpable resistant mass of tangerine size. The loop was narrow and irregularly filled. After one and a half hours barium was still present in this loop though the remainder had passed into the ileum while the cecum was not yet filled. After eight hours the small intestine was empty, but the resistance was still palpable but to the right of the midline with congestion of contrast medium and irregular filling of the jejunal loop at the site of palpable resistance. The shifting of the tumor from left to right side as well as the parallel shadows within the jejunal loop encircling the resistance, suggested possible presence of ascarides, especially in view of a positive history of parasite infestation. Treatment for ascariasis was negative. Before a protracted course of anthelmintic treatment could be undertaken, however, the patient suffered another sudden and severe hemorrhage. Operation, performed after a blood transfusion, disclosed a tumor involving the jejunum, subserous in situation, a portion of the size of a thumbnail projecting into the lumen and containing two ulcers, one of which was bleeding. Aside from this tumor which proved to be a leiomyoma, the operative site was negative. Following lateral anastomosis recovery was uneventful and the patient was discharged in good condition. Followup showed continuing improvement.

The roentgenologic demonstration of neoplasms of the jejunum as a filling defect is exceedingly difficult. Small, intraluminal bleeding tumors unfortunately will continue to escape attention since they hide in the convolutions of the intestinal loops. For that reason, in the case of recurrent attacks of melena thorough examination of the small intestine should not be omitted, especially when stomach and duodenum show no pathologic change.

Cancer of the Stomach in Addison's Anemia, W. A. Bourne, Brit. M. J., Jan. 17, p. 92, 1948. Because patients suffering from pernicious anemia are believed to be more liable to gastric cancer the author observed 15 cases radiographically and gastroscopically in the hope of detecting cancer of the stomach at an early stage. Of the 15, 3 had carcinoma and 2 had benign growths. It is suggested that this indicates once more how late clinical symptoms appear in cancer, and that one means of detecting the disease in the early stage is to watch all cases of pernicious anemia and alter present pathologic, radiographic and gastroscopic criteria.

Gangrene of Extremities of Venous Origin, H. Haimovici and G. Suffness, Am. J. M. Sc. 215:278, Mar. 1948. A case of gangrene of the lower extremity due to extensive thrombosis involving all the veins and patency of the arterial system is reported. Therapy varies with the phase. At the phlegmasia cerulea dolens stage the employment of papaverine and/or paravertebral block of the sympathetic ganglia, and anticoagulants, should prove effective against the angiospasm and further extension of the venous thrombosis. When gangrene sets in and the diagnosis of its venous origin is certain it is important to remember that the necrosis may remain superficial. Delaying amputation seems indicated therefore unless signs of toxemia are present.

Sigmoid as a Source of Right-sided Symptoms, Albert S. Lyons, Ann. Surg. 127:398, Mar. 1948. The principal causes for right-sided symptomatology in acute diverticulitis and carcinoma of the sigmoid are: (a) Sigmoid lies on the right side of the abdomen as a result of its mobility or the anatomic variations of its course; (b) perforation of the right wall of the sigmoid with spillage of exudate into the right iliac fossa; (c) extension of a perisigmoidal abscess to the right; (d) adherence of right-sided structures to the sigmoidal lesion; (e) marked distention of the cecum; (f) situs transversus. The commonest preoperative diagnosis in such cases is acute appendicitis. It is suggested that before removal of the appendix the sigmoid should be inspected.

In Memoriam

JEFFERSON CUMLEY PENNINGTON

M.D., F.A.C.S., F.I.C.S.

Surgery, especially urological surgery, has lost one of its most valuable and active members through the death of Jefferson Cumley Pennington. Dr. Pennington was born in Alabama and received his medical degree from Vanderbilt University. He settled to practice in Nashville, specializing in urological surgery, being associated with the Protestant, St. Thomas, Nashville General, Vanderbilt Hospitals, and serving as consultant to the Davidson County Tuberculosis Hospital, Davidson County Insane Asylum, and the Florence Crittenden Home. In his time he had served as President of the Southeastern Urological Section of the A.M.A., of the Mid-Tennessee Medical Association, and of the Mid-South Postgraduate Medical Association, Chairman of the Committee on Legislation of the Nashville Academy of Medicine, Chairman, Urological Section of the Southern Medical Association. He was also a member of the Board of Directors of the Nashville Academy of Medicine. Among his society affiliations were the American Medical Association, American College of Surgeons, International College of Surgeons, and numerous medical societies of the South. Dr. Pennington also contributed largely to the medical literature in his specialty.

GEORGE VAN INGEN BROWN

M.D., F.A.C.S., F.I.C.S.

Death has taken Dr. George Van Ingen Brown and plastic surgery and the surgical profession lose one of their finest practitioners. Born in 1862, in St. Paul, Minnesota, Dr. Brown received several medical degrees, the last from Marquette University in 1909. In the course of his long and active career he practiced and taught oral and plastic surgery and was prominently associated with various hospitals and academic institutions. Dr. Brown was an esteemed member of numerous scientific societies in the United States and abroad, was a Fellow of the American College of Surgeons, honorary Fellow of the International College of Surgeons, was of the Founders' Group of the American Board of Plastic Surgery; honorary member, American Society of Plastic and Reconstructive Surgery; President Milwaukee Academy of Medicine (1930). Dr. Brown was the recipient of a number of awards. Among his published works are The Surgery of Oral and Facial Diseases and Malformations, two chapters in the Cyclopedia of Medicine, and numerous monographs. He served in World War I and later was appointed Surgeon of the U. S. Public Health Service, with the Bureau of War Risk Insurance; Colonel, Officers Reserve Corps, U. S. A., 1923033; Consultant in Plastic Surgery of Veterans' Administration. Dr. Brown died April 2, 1948, after a long illness.

JOHN EDWARD RUISI

M.D., F.A.C.S., F.I.C.S.

With the death on May 28, 1948, of John Edward Ruisi the International College of Surgeons has lost an esteemed Fellow. Born in Italy in 1892 Dr. Ruisi acquired his higher education in the schools of Westerly, Rhode Island, and his medical degree from Tufts. In his postgraduate work and internships Dr. Ruisi acquired a broad foundation for his subsequent practice, studying diagnosis under Dr. Frederic Lord and other specialized studies in hospitals in Boston. He served in a surgical capacity with the AEF in World War I and then settled in Westerly to practice. He held connections with hospitals in Westerly, Providence and New London. His affiliations included Fellowship in the American College of Surgeons, the American Medical Association, and the International College of Surgeons. He had, in the past, served as president of the Washington County Medical Society, Westerly Medical Association and Westerly Medical Society. He has been President of the Rhode Island Medical Society since 1920. Under the auspices of the Rhode Island Medical Society Dr. Ruisi frequently made radio broadcasts on medical and surgical subjects.

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Of the many types of anesthesia, spinal procedures are the most exacting in their requirements. Because of its pharmacological precision, NEOcaine has demonstrated its fitness for spinal anesthesia over a thirty-year period of clinical use.

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ADMINISTRATION: Employ 1 mg. of NEOcaine per pound of body weight, up to 150 mg. Dissolve crystals with spinal fluid led into the ampoule. Inject slowly with optional barbotage, using a 22 gauge needle. Contraindicated in gastrointestinal perforation, obstruction, peritonitis, severe hypotension, cerebrospinal or dorsal skin disease. Drug idiosyncrasy is rare.

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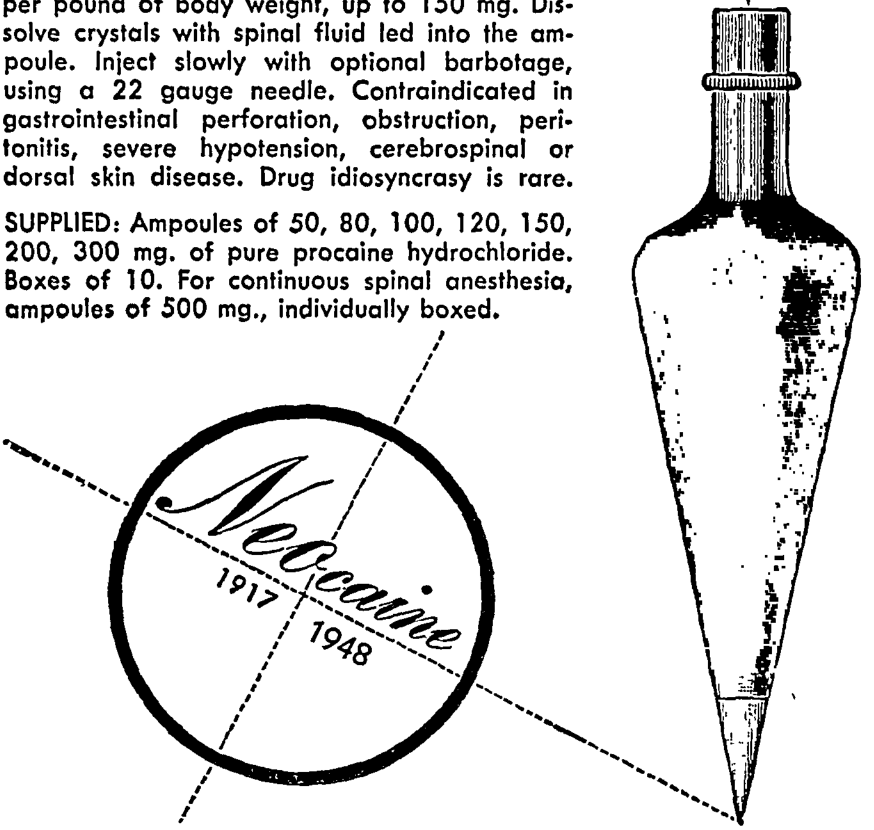

ANGLO-FRENCH Laboratories, Inc.
75 Varick Street, New York 13, N. Y.

TO OUR READERS

In this issue of the International College of Surgeons' *Journal*, we are honoring the natal anniversary of two of America's foremost surgeons, Doctors Raymond W. McNealy and Karl A. Meyer of Chicago. These men are active in the teaching and practice of their profession, and whatever is said of them today may be observed in their respective hospitals and teaching centers.

It is fitting that the Editor of the International College of Surgeons' *Journal* has elected to dedicate this issue to them jointly since they are devoted personal and professional friends. Both teach in Northwestern University and both are connected with the great Cook County Hospital. It is a pleasure and an inspiration to attend their clinics and to see the precise and masterly execution of the most intricate surgical procedures.

They both enjoy the distinction and recognition by membership in The American College of Surgeons, The International College of Surgeons, The American Board of Surgery, the Western Surgical Association and numerous other medical and surgical societies.

We salute them both as stalwart leaders of the surgical profession, great clinical teachers and true friends of the medical and surgical profession everywhere. May their successful work in surgery continue ad multos annos.

HERBERT ACUFF
President-Elect,
International College of Surgeons

Dr. Karl A. Meyer

Dr. Meyer was born September 28, 1
in Gilmore, Illinois. He graduated from
University of Illinois, College of Mc
in 1908, served his internship at Cook
Hospital from 1908 to 1910. He b
ical Superintendent of Cook Co
in 1914, in which capacity he sti
is Attending Surgeon at the
Hospital, Professor of Surg
County Hospital Graduate S
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University School of Medic
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Clinical Surgery at the U
(1920–1925). He is Hon
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man of the Board of T
States Chapter; Fellow o
lege of Surgeons, P
Chicago Surgical Socie
contributor to the su
surgeon of note.

Dr. Raymond W. McNealy

Born in 1886, Dr. McNealy graduated from the University of Illinois College of Medicine in 1910, interned at Cook County Hospital to 1912 and took postgraduate work in Vienna in 1913. He is Attending Surgeon and President of Staff, Cook County Hospital; Chief Surgeon of Wesley Memorial Hospital; Associate Professor of Surgery at Northwestern University Medical School; Professor of Surgery, Cook County Graduate School of Medicine; member of the Public Health Advisers of the Department of Public Health, State of Illinois, and Secretary-Treasurer, Hektoen Institute. He is Chairman of the Qualification Board of the International College of Surgeons and his memberships in scientific societies and contributions to surgical literature are too numerous to mention.

Both of these o

young

Original Articles

Observations on Surgery and Surgeons in Europe

HERBERT ACUFF, M.D., D.Sc., F.A.C.S., F.I.C.S.
KNOXVILLE, TENNESSEE

ON our recent visit to Italy and other countries in Europe on the occasion of the Sixth Biennial Assembly of the International College of Surgeons, it occurred to me that so very much of the fundamental knowledge of anatomy, medicine and surgery came from these countries that one should take time out and walk in the footsteps of some of these masters and look back in retrospect to the days when they actually lived and worked.

ITALY

Italy was the first country visited, and Rome was the first city. Both Italy and Rome are so replete historically in so many phases of our living that one is intrigued with the environment from the moment one arrives. From my days in the study of history, I remember that the earliest hospital foundation in the West, according to St. Jerome, was that of Faviola at Rome about the end of the fourth century. Faviola herself, being a practical nurse as well as a great organizer, instituted the system of visiting the sick in connection with hospital work. This was the forerunner of the present day visiting nurse. She did a great deal of charity and there was no distinction of creed or race in her ministrations. The great and noble work of this woman deeply influenced the people all over Europe.

As one pursues his travels and studies in and about Rome and other parts of Italy, the great array of old masters and discoverers in the various phases of anatomy and medicine passes in review. We think with fitting tribute and respect of Marcello Malpighi who lived between 1628 and 1694, his great contribution in the discovery of the capillaries in the lungs, and his work in connection with the red corpuscles of the blood, the minute structure of the kidneys and spleen as well as his masterly demonstration of the rete Malpighi of the skin and structure of the teeth, which have become basic concepts in all subsequent study in those respective fields. We recall of course the malpighian bodies, the structure of the tongue, his demonstration that papillae of the tongue are organs of the sense of taste and that the papillae of the skin are organs of the sense of touch.

He was a great scientist, a student, and became the Papal physician to Pope Innocent XII, remaining in this position for three years prior to his death in 1694 at the age of sixty-six.

We think of Antonio Pacchioni whose greatest contribution to medicine and surgery was perhaps in his studies of the anatomy of the meninges and brain. More recently we think of Duranti who introduced the osteoplastic bone flap in brain surgery. We think of Bassini whose name is an operating room byword in practically every hospital in the land. It was he who perfected the technic of herniorrhaphy and, strange to say, few if any improvements on his procedure have stood the test of time.

We think of Antonio Carle and his excellent contributions to the surgery of the thyroid and gastrointestinal tract. While he lived in Turin, his teachings and methods were emulated by surgeons of all Italy. He died in 1927. We revere the memory and great contributions to surgery of Mario Donati and Ottorino Uffreduzzi whose brilliant careers were cut all too short by their untimely death.

The work of the International College of Surgeons was carried on and all scientific sessions held at the Policlinico Hospital, Numero 1, Umberto Avenue in Rome. This is a large, rambling type of building with

PROPERTY O

Dr. Karl A. Meyer

Dr. Meyer was born September 28, 1886, in Gilmore, Illinois. He graduated from the University of Illinois, College of Medicine, in 1908, served his internship at Cook County Hospital from 1908 to 1910. He became Medical Superintendent of Cook County Hospital in 1914, in which capacity he still serves. He is Attending Surgeon at the Cook County Hospital, Professor of Surgery at Cook County Hospital Graduate School of Medicine, Professor of Surgery at Northwestern University School of Medicine, Chief Surgeon of Grant Hospital, a Trustee of the University of Illinois, and formerly Professor of Clinical Surgery at the University of Illinois (1920–1925). He is Honorary Fellow of the International College of Surgeons and Chairman of the Board of Trustees of its United States Chapter; Fellow of the American College of Surgeons, Past-President of the Chicago Surgical Society. He is a prolific contributor to the surgical literature and a surgeon of note.

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Both of these outstanding surgeons were born in the same year, served their intern in the same institution, are now occupying similar positions in the education of yo surgeons. Not only has their collaboration and cooperation been unusually success but also palpably entwined.

clinics there has collected a series of 5,000 partial gastric resections and another clinic has accumulated a series of 3,000 partial gastrectomies. The reason given for this rather radical number of gastric resections is the economic level of the patients since many cannot afford rehospitalization nor can they afford the indisposition with loss of work which might result from palliative measures.

There is a rather high incidence of tuberculosis in Italy and a considerable amount of excellent thoracic surgery is being done. It was an interesting observation that the greater portion of this thoracic surgery was done by general surgeons in the regular course of their operative work.

At present much greater stress is being laid upon the training of young surgeons in Italy than formerly. They are kept in formal training from three to five years, during which time they are permitted to assist as first and second assistants to the professors in charge, and afterward begin to work under the strictest surveillance.

I was very much impressed with the dignity with which the medical and surgical meetings were conducted, having had occasion to attend a meeting of the Societa Romana di Chirurgia in Rome. This meeting was presided over by Professor Raffaele Paolucci who is also President of this Society. The deliberations of the meeting were dignified, professional and quite impressive. Four of the Fellows of the International College of Surgeons were given Socio Honorario in this Society. This distinction is made all the more impressive, not only by the beautiful embossed certificate which is presented, but by the personalized medal bearing on the one side the name of the individual so honored, with the date, and on the opposite side the proverbial symbol of Romulus and Remus nursing the wolf.

One is impressed by the dignity that characterizes the various meetings and ceremonies which are held in Italy as compared with the informality of our own society meetings. The Assembly in Rome was from every standpoint an outstanding success. It is well nigh impossible to pay the proper tribute and thanks to the many men whose efforts were a contributing factor to the success of the Assembly. In addition to those who have been prominently mentioned the names of Doctors Valdoni, Parduini, Montenere, Tosati must also be cited for they will always remain as highlights in the success of this journey to Rome.

Being a firm believer in the value of the gastroscope in upper abdominal surgery, I was interested in the analysis of 260 cases of gastric disease reported by Dr. diNatale of Milano. He suggests two uses for the gastroscope: one, the determination of the lesion prior to operation and therefore the procedure to be carried out at operation; two, the endoscopic examination which may give information sufficient to make operation unnecessary. He strongly emphasizes the importance of collaborating with the radiologist.

Dr. Valdoni gave a beautiful presentation of 100 abdominal operative cases. Valdoni uses an alternative anastomosis between the gallbladder and intestine in cases where there is obstruction, growth or stricture of the common duct.

Dr. Tosati presented a series of some 700 cases in which he had evaluated the transverse incision versus the vertical incision. He quotes extensively the work of Hamilton Bailey of London and of Max Thorek of Chicago.

Dr. Paolucci presented a series of 25 cases of mediastinal tumors treated by surgery, all of which recovered except one who succumbed on the tenth day to a heart complication. It was interesting to observe Dr. Paolucci using only local and regional anesthesia and ploying the anteroposterior or lateral transpleural approach. This procedu most illuminating.

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Thus came to a close one of the most successful Assemblies of the International College of Surgeons as yet held outside of the United States.

At his home in Rome the American Ambassador to Italy, Mr. Dunn, gave a lovely reception for the local and visiting surgeons on Sunday following the close of the Assembly. It was indeed a colorful occasion and gave us an opportunity to meet and discuss Italo-American relations with members of the diplomatic staff. During the previous week the Hungarian and Peruvian Embassies had entertained visiting members of the College.

The members of the International College of Surgeons were cordially invited to attend the Medical Congress to be held in Torino, May 27 to 30, 1948. The International Surgical Days were held by the International Blood Transfusion Congress, the National Congress of the Italian Hematological Society and the Piedmont-Liguria-Lombardy Radiological group who were holding joint sessions. It was fitting that this great and representative assembly should commemorate the life and surgical contributions of three of Italy's distinguished surgeons: Antonio Carle, Mario Donati and Ottorino Uffreduzzi.

Professor Mario Dogliotti, President of the Italian Section of the International College of Surgeons and Director of the Surgical Clinic of the University of Torino, was General Chairman of the Congress, and he was ably assisted in the conduct of this meeting by many of the prominent surgeons of Turin, all of whom were most generous with their time and lavish with their entertainment for the visiting guests. We were honored and delighted to be received into the homes of Professor Mario Dogliotti, Professor A. Bertocchi, President of the Piemontese Surgical Society, Professor U. Camera, famous orthopedic surgeon of Turin, and finally enjoyed a most colorful luncheon given by the Torino Medical Society.

I was very much interested and impressed by the work of Antonio Bobbio, Secretary of the Congress, of the Department of Surgery at the University of Torino. Interesting work and results in partial gastrectomy in the treatment of perforated gastric and duodenal ulcers was shown. He summarized the literature and concurred in the conclusion that subtotal gastrectomy should be done for (1) every resectable carcinoma of the stomach, (2) gross hemorrhage, (3) pyloric obstruction, (4) two or more perforations, (5) repeated hemorrhages from peptic ulcer, either duodenal or gastric.

In discussing the type of procedure ememployed Dr. Bobbio stated that the surgical group of Turin and vicinity largely followed the teachings of the late Doctors Donati and Uffreduzzi. Since 1937 practically all Italian surgeons have adopted the method of gastric resection for uncomplicated peptic ulcer cases, and the operation is now done in from 70 to 90 per cent of patients who undergo surgery for gastric lesions. The mortality range is from 2 to 5 per cent.

Professor Mario Dogliotti succeeded Professor Uffreduzzi in the Surgical Department of the University of Torino. He concurs in and practices the teaching of subtotal gastrectomy for the peptic ulcer syndrome.

I made a most interesting visit to the Ospedale Maggiore di San Giovanni in Turin. This is the city hospital, is quite modern, rather well departmentalized into surgery, medicine and the various specialties. It is staffed, however, by members of the University of Turin. I believe I am correct in saying that it is the combined thought and practice of Professors Dogliotti, Bertocchi and Bobbio that subtotal gastric resection be done as a procedure of choice in the peptic ulcer syndrome for the following reasons:

1. It completely removes the ulcer.
2. It offers the greatest economic safeguard for the safety of the patient.
3. It offers the greatest number of permanent cures.
4. It obviates the possibility of carcinoma.

It is interesting to note that Professor Dogliotti has recently published an excellent work on surgery, my only difficulty being that I am not too adept at the Italian translation. It is profusely illustrated, however, and his cuts are almost self-explanatory.

It was my privilege and pleasure to attend a meeting of the Societa Piemontese di Chirurgia at which time I was again fortunate in receiving the Socio Honorario. Again, as at the meeting of the Surgical Society in Rome, I was deeply impressed with the dignity and professional conduct of their meetings. The surgical clinics were put on early in the morning as in the meeting at Rome and were done in a most scientific way. Technic is good, operating room equipment is adequate.

Entertainment for the members of the meeting was most lavish and generous. Scientific papers were excellent and the attendance was large. The meeting closed with one of the most colorful banquets I have yet attended at which the surgeons of Turin were most ably assisted by their charming and attractive wives.

ENGLAND

This most successful and delightful meeting in Turin having come to a close, my next opportunity for scientific investigation and observation was in England. Although I had visited many of the hospitals in London at previous visits, I was impressed with the age of these old institutions and how for many years they had been serving the public of the world's greatest metropolis. To that end I made some investigation and was somewhat surprised at the facts obtained which are as follows:

Westminster Hospital was founded in 1719, Guy's Hospital in 1725, St. George's Hospital in 1734, Winchester and Bristol Hospital 1736, London Hospital 1740, Middlesex Hospital 1745 and the University College Hospital in 1828.

In delving into the history of these grand old hospitals, it was only natural that the names of the great surgeons who worked in them previously should come to the forefront. I recall the name of Joseph Lister who opened the way to aseptic surgery for generations to come. Born in 1827, he had studied medicine in the University of London and later went to Edinburgh for postgraduate work where he became a pupil of James Syme, and incidentally married Syme's daughter. Later he became Professor at Edinburgh.

His old home city of London, however, beckoned for Lister's return, and he became Professor of Surgery at Kings College in London where he remained until his retirement. Needless to say he was one of the greatest and most revered surgeons, not only of England, but of the world His contribution to surgery is monumental.

It was fascinating to stroll reminiscently around the streets of London and realize that one was walking in the footsteps of such men as Sir James Padgett, Sir Jonathan Hutchinson, Sir Victor Horsley, Sir William F. Teevan, Sir William Arbuthnot Lane, Sir Arthur William Mayo Robeson, Sir Rickman John Godlee. Outside of London proper was the matchless Lord Berkeley Moynihan and Sir Robert Jones, Sir Harold Stiles, Sir David Wilke—all of them mile posts of modern progressive advancement in surgical science throughout the rich history of England's political and surgical development.

St. Thomas' Hospital occupies a large and splendid range of buildings on the Thames embankment opposite the House of Parliament, Guy's Hospital is located in Southwark, and St. Bartholomew's in West Smithfield. These are the three endowed hospitals. In addition, there are Charing Cross Hospital, St. Mary's Hospital, Royal Free Hospital, all having medical schools attached, as does St. George's Hospital, London Hospital and Middlesex Hospital.

Among hospitals with no medical schools attached may be mentioned the Royal Northern Hospital, West London Hospital and the Metropolitan Hospital, Hampstead and Northwest London Hospital. There is also the British Postgraduate Hospital which is situated in Hammersmith, Duncan Road, W 12, London, whose chief surgeon at the present time is Professor Ian Aird. It was my privilege to visit his clinic and see the excellent work being performed by him and his staff, and the special follow-up system which they are using in this hospital as well as the splendid facilities for teaching.

At Professor Aird's invitation I had lunch with and met the staff. Professor Aird presented a number of interesting cases himself and other members of the staff were operating in adjoining rooms. The technic is excellent, the familiarity with anatomy is splendid and the discourse throughout the operation is indeed most helpful to the students and visitors who happen to be standing by.

Professor Aird was recently accorded the position of Professor of the Postgraduate, having come there from the Royal Infirmary and Medical School in Edinburgh.

It was my privilege to visit the Royal Northern Hospital where Mr. Hamilton Bailey is Surgeon and surgeon in charge of the Genito-Urinary Department. He does an enormous volume of work and does it also with the greatest ease and facility. He is very opinionated and precise in his methods, and his various assistants and nursing staff seem to know exactly what he wants. I was impressed with the ease in manner with which he conducts his morning schedule. Mr. Bailey is a prodigious worker, writer, and one of the widest known medical authors in all Europe.

It was my privilege and pleasure to visit with him and his charming wife in their palatial home some twenty miles from the center of London. It was a beautiful drive through the country and I was amazed when I came upon this genuine old castle with some eight acres of beautiful, well-kept grounds including statuary, pools and evergreens. It was most interesting to be escorted through the twenty-two rooms in the house and be given by Mrs. Bailey a detailed history of each of them.

One of the nice things is the interest which Mrs. Bailey takes in the work of her husband, both in his writings and in his surgical schedules. They are indeed two charming and sincere people, and his worth to the people of London and England will pay dividends in appreciation long after he is gone.

The hospitals are in rather poor repair in England. This seems to be due rather to the lack of material available than to lack of funds. It is an interesting observation that work is somewhat segregated in the hospitals in London, for instance, urology at St. Peter's Hospital, colon surgery at St. Mark's Hospital, and so on. I was interested in the splendid cancer program at Middlesex Hospital.

I made a visit to Westminster Hospital to see the improved technic for repair of inguinal hernia devised by Dr. Tanner. This is a procedure in which the fascial sheath of the rectus muscle is divided and literally slipped over to repair the defect in the inguinal region. It has been followed for some three to five years and the results have been brilliant. A great many of the surgeons in England are now using the Tanner procedure for herniorrhaphy.

In order to become more conversant with the English plan of socialized medicine I went to the Home of the British Medical Association whose Secretary is Mr. Charles Hill. Much constructive work is done by this organization. They are now submitting a brochure to the government authorities which literally revises the methods of teaching, requirements for medical schools and so on. They were kind enough to present me with a copy, and the plan would seem to be both logical and workable, if accepted.

Briefly, this is my understanding of how the medical insurance system works after conversation with numerous physicians and surgeons in Great Britain: An employed man will have almost a dollar a week taken out of his pay for this insurance fund. His employer will add about 83 cents, and to that the Government will contribute about half a dollar. When the contributor has made the required number of weekly payments, which vary with different benefits, he and his family will be eligible for sickness, unemployment, maternity and other benefits. He keeps on paying as long as he works whether he draws from the net or not.

If the man is taken sick, he will receive about $5.20 a week plus $3.20 for his wife and $1.50 for the oldest child. The rest of the children are covered by family allowance payments under another social service program.

Just about everyone will be covered by the new insurance scheme although payments will vary, and while many middle class professional people will want to continue paying their own family doctors, they will probably sign up for free care if they need treatment by a specialist. The upper bracket income people can be expected to continue paying their own doctors. The Minister of Health, however, expects 95 per cent of the population to register as nonpaying patients, and if that should prove to be the case, Government statisticians figure a doctor could make up to $13,000 a year in Government payments.

Doctors are to be paid a "capitation grant" from the Government for each insured person they treat under the new scheme. They can limit their practice entirely to these "panel" patients or treat them part-time.

Health Minister Bevan proposed to supplement the capitation grants by a basic salary of $1,200 a year, but the doctors protested loudly, fearing that he meant to set up a full-time salaries service. In February the British Medical Association took a vote, and only 4,084 of the 29,000 doctors voted for

Mr. Bevan's plan. Eventually, however, a compromise was reached. The minister gave his assurance that no full-time state medical service would be set up without a new Act of Parliament, and some 8,639 general practitioners voted for the new plan on the second plebiscite.

Fig. 1. *Autopsy performed by Professor Jules Emile Péan and staff at the Hotel Dieu, Paris. From an original painting by Henri Gervex.*

Practitioners who choose to join the service have the choice of being paid entirely by capitation fees or receiving a basic salary plus smaller capitation fees. Young doctors setting up in practice after July 5, 1948, receive the basic salary and fees for three years and then may choose the arrangement they prefer. How much a doctor will earn under the scheme will depend upon whether he is an old hand or just starting out, whether he takes all "free" patients or some paying, how many he has in a year, and whether he is a general practitioner or a specialist.

FRANCE

After completing a very pleasant week in England, I returned to France where many historical shrines in medicine and surgery exist. I was particularly interested in the Hôtel Dieu because it is one of the oldest in Europe and said to have been established in the year 1000 A.D. It was destroyed, however, in 1772, but promptly rebuilt. It is located on the north side of the island opposite the Cathedral of Notre Dame. While the exterior shows its age, the interior is immaculate and very well kept. One of the points of interest is the impressive mural depicting Professor Péan and his teaching staff.

While strolling through the old art galleries of France, I found an original painting of Professor Péan and two of his assistants conducting an autopsy. This painting was done by Henri Gervex and depicts the peculiar lighting arrangement in the Hôtel Dieu in which the recessed windows in the roof will permit the greatest influx of natural light for the benefit of the operating rooms, etcetera.

After this very interesting visit to the Hôtel Dieu, I visited the Morgue. It is stated that this morgue dates from the fifth century and is the spot where bodies of unknown persons who have perished by accident, murder or suicide are exhibited so they may be identified by friends or relatives. If these bodies are not claimed within a certain period of time, they are either buried or given over to the medical institutions for scientific purposes.

Upon the occasion of this particular visit, there were some forty or fifty bodies awaiting identification. I was impressed with the many means of identification which were employed by the officers in charge of this morgue. Not only finger prints but the length of arms, bones in the arm, legs, moles on the face, scars, hair, teeth, and every available means to identify the body were used. It is really a pathetic sight to stroll through this morgue and see the fine young people, especially young girls, expectant mothers, who have voluntarily paid the supreme sacrifice.

My next visit was to the Hôtel des Invalides. The buildings, which stand some 600 feet back from the River Seine, were begun in 1671 and comprise some 30 acres. It was built by Louis XIV to care for the aged servants of the Court, but later it was also used for invalid soldiers. At the present time some 5,000 to 6,000 disabled veterans of French wars are living there and receiving nursing and medical care at government expense.

It is the general impression of the tourist that the Hôtel des Invalides, with its gilded dome surrounded by a tall wrought iron fence, is only the tomb of Napoleon. The hospital buildings are situated to the right and back of the tomb. The general plan of caring for the veterans is much on the order of the American Veterans facility.

In 1937 I had visited the house in Warsaw, Poland, where Marie Sklodowska was born on November 7, 1867. I was then told that she was the youngest of five children and that as an orphan at the age of seventeen she became a governess to the children of a rich gentleman, saved her money and came to the University of Paris at the age of twenty-two and enrolled as a student in physics.

During the same year, 1937, I came to the Sorbonne University of Paris to study cancer and here found the true story of events as they happened to Marie Sklodowska. She must have been attractive as well as brilliant, because in July, 1895, she married her teacher in physics, Professor Pierre Curie, moved into his laboratory, and the two continued their studies until they announced to the world the discovery of radium and polonium from mineral pitchblends. In 1903 the Curies were jointly awarded the Nobel Prize. When Professor Curie was run over and killed by a vehicle in Paris, Marie Curie succeeded him as Professor of Physics.

The next major event was the creation of a Radium Institute by the University of Paris in which Madame Curie was made head of the research department. In 1921 she was invited to the United States where she received from the hand of the President the gift of a gram of radium from the American people. She returned again in 1929 and was given a check for $50,000 with which to pursue her studies in research.

Madame Curie died July 4, 1934, at the age of sixty-six. Her close contact with radioactive substances no doubt hastened her death which resulted from pernicious anemia.

On my return visit this year I saw the great work in cancer therapy being continued after the method of fractional x-ray therapy by Coutard and radium therapy after the method of Regaud. The clinics are crowded every day with people from all over the world who come feeling that the commonly known Curie Institute is the oldest and should be the best. I have never seen as many cancer patients anywhere else.

I was grateful for another visit to the shrine of endeavor of this great scientist, Marie Curie. The staff is eager for every new discovery that may come from the Atomic Energy Commission, especially cobalt because of its implied equal efficiency and marked reduction in cost.

It was a source of regret that I did not have an opportunity to see more of the work of the surgeons of Paris since many of them were away for summer vacation. I hope to return there next year for a visit with them.

My return home was on the Queen Elizabeth. Here I had the opportunity of meeting Professor Robert McWhirter of The Royal Infirmary and Medical College in Edinburgh. There were some thirty surgeons aboard and we had the privilege of hearing Dr. McWhirter explain his more or less revolutionary management of carcinoma of the breast. The Edinburgh school has embarked on a second five-year plan of procedure in breast management which is roughly as follows:

In those breasts which present lesions with or without apparent metastases, only simple mastectomy is performed without invading either the supraclavicular or axillary areas. After this operative procedure, x-ray therapy is employed, using a special technic with emphasis upon filtration as designed by the Edinburgh group, and these treatments are carried out rather methodically and after a definite order of procedure. Working with the Minister of Health, they are able to follow more closely the results of their treatment, and the cases are grouped without respect to age, stage of disease or extent of spread. Professor McWhirter emphasized a study of a cross section of people suffering with the disease rather than taking any single group from which statistics might be obtained.

The surgeons aboard the Queen Elizabeth were much impressed with his discussion of the subject and his results obtained as was evident from the low mortality statistics which they have been able to obtain over the first five-year period. Since it is a rule of the Minister of Health that statistics on cancer are not to be given out under a five-year period, it will be some three years before the second study can be evaluated. In the meantime, however, the first five-year study will be available and the profession will be able to place a proper evaluation on this type of treatment over a ten-year period of time. The surgical profession of the world looks with eager eyes to the work of Professor McWhirter and the Edinburgh school.

Thus ended the most enjoyable two months in the various cities and countries of Europe and a most pleasant association with many surgeons of these countries.

Our Present Knowledge of Gastric Cancer[*][†]

WILLIAM CARPENTER MacCARTY, Sr., M.D.,
F.A.C.P., F.A.S.C.P., F.I.C.S. (Hon.)
ROCHESTER, MINNESOTA

OUR present knowledge of gastric cancer has evolved through several phases, each one contributing a new opportunity for observation, study and generalization. The first began with the opportunity to see disease in its last and fatal stage at autopsy. Early gastric cancers usually do not kill their hosts; therefore, autopsy pathologists rarely, if ever, see early cancer. Moreover, autopsies are accompanied by premortem and postmortem changes which prevent us from seeing the true cytologic facts which are necessary in the study of cytogenic and histogenic evolution of cancer. The autopsy picture today is very little better than it was when reported by Morgagni (1769), Baillie (1793), Abercrombie (1824), Cruveilhier (1835–1842), Müller (1860), Hauser (1883) and Welch (1885).

The second phase may be called the clinical diagnostic phase before gastric roentgenography and roentgenoscopy. Clinicians of the last century also never recognized gastric cancer in its early stages. Bright in 1860 reported 116 abdominal tumors and did not mention gastric cancer; Osler and McCrae (1900) reported 150 gastric cancers which they saw clinically and all were in the hopeless stage; 9 were operated on and the medical and surgical mortality rate was 100 per cent.

The third phase was surgical; it grew gradually only with the slow advance of our knowledge of gastric anatomy, asepsis, anesthesia and surgical technic, all of which were very crude up to and including the first two decades of the twentieth century. It took many years of experimentation on dogs by such daring surgeons as Merrem (1810), Gussenbauer and Winiwarter (1876) and Kaiser (1876–1877), Torelli (1865), Péan (1879), Billroth (1881), Wölfler (1880), Doyen (1892), von Hacker (1894), Murphy, W. J. Mayo[19-23] (1894) and many operations on human beings even to begin a reasonable and relatively safe surgical approach to the disease. It has taken much longer to educate general practitioners to the clinical recognition of the possibility of gastric cancer being present without classical textbook signs and symptoms, and to teach them that early cancers can be removed surgically with low mortality, increased comfort and prolonged life for the patient.

The fourth phase has been one of the greatest factors in the early recognition of the disease and its early treatment. This did not begin until the second decade of the twentieth century and was not well developed before the end of the second decade and beginning of the third decade. Despite the fact that Roentgen discovered x-rays in 1895, it was not until 1911, 1912 and 1913 that Holzknecht (1911), Groedel (1912), Haudek (1912), Forssell (1913), Carman (1913) and other roentgenologists of that period perfected a technic for x-ray examination of the stomach and had time to compare their observations with those made at operation and in the surgical laboratory. It was then that physicians began to see early gastric cancers under the most favorable conditions for study. Some years before the use of x-rays for the study of the stomach I reported[16] (1910) a study of 216 resected gastric cancers which was the first relatively large series that had been seen. In that report I stated: "The question—do ulcers become malignant as one of their sequelae? seems from my material at least to be answered in the affirmative. What percentage heal, perforate or become malignant is impossible to determine." This is just as true today, after the observation and study of 4,016 gastric cancers and 2,912 gastric ulcers, from 1907 to 1947 inclusive, as it was in 1910.

The fifth phase began about 1912 when I started my studies of living cells without fixation, without embedding and without the use of stringent stains, in other words, without

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[*] Read before the Indiana Section of the International College of Surgeons, Indianapolis, Indiana, April 20, 1948.

[†] From the Section on Surgical Pathology, Mayo Clinic, Rochester, Minnesota.

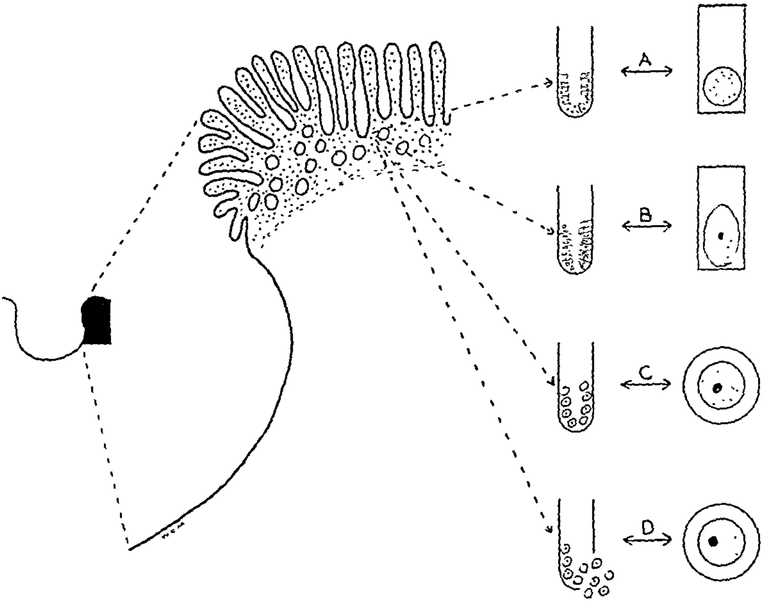

Fig. 1. Diagram of a section through the border of a gastric ulcer. Some tubules show adult types of cells (A); some show a regenerative reparative type of cell (B); some (C) show cancerlike cells (secondary cytoplasia); and some show the cancerlike cells in the stroma (D). The average diameter of lesions A and B is 1.58 cm., of C, 1.49, and D, 2.17 cm.

the many artifacts which have characterized most, if not all, of our histologic methods. It was in this phase that roentgenologists began to see small lesions but were not certain whether or not they were cancers. The surgeon, however, was willing to explore and resect. That material furnished the opportunity which evolved some definite cytologic and histologic facts.[17, 18] It was stated that the majority of chronic ulcers showed adult type cells in their tubules; some showed a regenerative type of cell; a small series (10 to 14 per cent) showed intratubular cells morphologically identical with definite cancer cells, and others showed the line of demarcation between the tubules and the surrounding stroma partially obliterated with some of the cancerlike cells in the stroma (Fig. 1). While these observations were very suggestive, at no time did I ever call the ulcers with cancerlike cells within the tubules "cancer." I called that condition "secondary cytoplasia" for identification and study and found it in from 10 to 14 per cent of resected chronic gastric ulcers.

The average diameter of all resected benign gastric ulcers was 1.58 cm. (Table 1), the average diameter of those with secondary cytoplasia was 1.49 cm., and the average diameter of those with some of the cancerlike cells in the stroma was 2.17 cm. This last figure was very suggestive because I had long since learned empirically that the great majority of chronic gastric ulcers larger than 2.5 cm. in diameter were definitely cancerous. It is also interesting and important to note

TABLE 1. DATA ON GASTRIC ULCERS RESECTED IN SEVEN YEARS.

Year	1941	1942	1943	1944	1945	1946	1947	Totals
Number excised	72	86	132	94	119	112	120	735
Average size in cm.	1.4	1.3	1.7	1.7	1.8	1.3	1.87	1.58
Percentage under 2.5 cm. in diameter	87.5	90	74	75	72	75	75.8	78.5
Number of resected gastric cancers in same years	59	110	119	109	138	111	103	749

TABLE 2. DATA ON GASTRIC CANCERS REMOVED IN 30 YEARS.

Year	No.	Nodal Involvem. %	Size in Cm.		All Cancers		
			With Nodal Involvem.	Without Nodal Involvem.	Average Size	Under 2.5 Cm. Diam., %	2.5 Cm. Diam. or Larger, %
1918	72	63	6.7	4.7	5.7	6.1	93.9
1919	109	65	7.6	7.1	7.3	4.7	95.3
1920	122	61	6.7	6.9	6.8	5.5	94.5
1921	78	51	6.7	5.7	6.2	5.3	94.7
1922	128	59	6.9	5.5	6.2	1.3	98.7
1923	117	51	6.6	5.0	5.8	11.0	89.0
1924	98	56	7.0	5.3	6.0	5.8	94.2
1925	102	59	6.7	4.9	5.8	4.2	95.8
1926	121	47	6.7	5.2	5.9	9.8	90.2
1927	135	45	6.2	5.7	5.9	5.8	94.2
1928	132	53	6.7	5.4	6.0	8.9	91.1
1929	136	41	7.1	4.9	6.0	5.5	94.5
1930	110	43	7.4	4.3	5.8	7.8	92.2
1931	108	56	7.5	6.1	6.8	4.8	95.2
1932	64	57	6.5	4.8	5.6	10.0	90.0
1933	61	45	6.9	5.3	6.1	6.6	93.4
1934	99	54	7.5	6.4	6.9	6.0	94.0
1935	83	46	7.4	6.2	6.8	7.0	93.0
1936	98	51	6.7	4.8	5.8	21.0	79.0
1937	101	58	6.8	6.1	6.4	10.0	90.0
1938	111	58	7.3	5.7	6.5	9.0	91.0
1939	114	50	6.1	4.9	5.5	14.0	86.0
1940	109	71	6.9	4.4	6.0	17.0	82.0
1941	59	66.1	7.2	4.55	5.8	13.7	86.3
1942	110	61	6.9	5.2	6.0	10.0	90.0
1943	119	70	6.8	5.4	6.1	9.8	90.2
1944	109	66	7.2	5.1	6.1	9.0	91.0
1945	138	72	7.1	4.8	5.9	7.0	93.0
1946	111	65	6.3	5.0	5.6	5.6	94.4
1947	103	67	7.2	6.2	6.7	9.1	90.0
Total	3.157	56%	6.88 cm.	5.36 cm.	6.06 cm.	8.36%	91.6%

that 8.36 per cent of our resected gastric cancers were under 2.5 cm. in diameter and that some of them were associated with involvement of the lymph nodes (Table 2). In

other words, there are such things as small cancers despite the fact that the average diameter of all of our cancers was over 6 cm. The great probability is that all gastric cancers were once small. We are beginning to see some of these small cancers as a result of clinical suspicion, roentgenoscopy, surgical diagnostic exploration, resection and better methods of studying surgically removed specimens immediately after their removal.

CONCLUSIONS

1. Only 25 per cent of all gastric cancers seen clinically are resectable.
2. In the last 30 years, only 8.36 per cent of all resected gastric cancers have been smaller than a quarter (2.5 cm.).
3. At least 3.4 per cent of all resected gastric cancers smaller than a quarter already are associated with involvement of the lymph nodes.
4. If the roentgenologist, endoscopist, surgeon or gross pathologist says a gastric ulcer is smaller than a quarter, approximately 1 of every 10 of these ulcers will be cancerous.

In order to discover early gastric cancers it has been necessary to remove approximately one benign ulcer for every cancerous lesion; if this had not been done, 8.36 per cent of the gastric cancers would not have been discovered as relatively small cancers.

SOMMAIRE

Seulement 25% de tous les cancers gastriques reconnus cliniquement sont résectables. Dans les 30 dernières années, seulement 8.36% de tous les cancers chroniques résectés avaient un volume moindre de 2.5 cm. Au moins 3.4% de tous les cancers gastriques résectés étaient plus petits que 2.5 cm. et étaient associés avec métastases dans les nodes lymphatiques. Si le roentgénologiste, l'endoscopiste, le chirurgien et le pathologiste disent qu'un ulcère gastrique est plus petit que 2.5 cm , á peu prés un de 10 ces ulcères est cancereux.

Afin de reconnaitre les cancers gastriques á temps, il est nécessaire d'enlever tout ulcère bénin. Si cela n'avait pas été fait, 8.36% des cancers gastriques n'auraient pas été reconnus comme petits cancers.

SUMARIO

Solo un 25 % de las canceres del estomago que son reconocidos clinicamente son resectables. En 30 años de experiencia, solo 8.36% de los canceres gastricos que fueron resectados, el tamano del tumor fue de menos de 2.5 cm. de diametro y de estos casos por lo menos un 3.4% presentaron metastases en los ganglios linfaticos. Aproximadamente cuando se diagnostica la ulcera gastrica de tamano menor de una pulgada de diametro uno de cada dies casos son o se hara cancerosos. Por lo tanto es menester el resectar aproximadamente una ulcera benigna por cada lesion cancerosa si se va a descubrir tempranamente el cancer gastrico. Solo asi es como se ha podido descubrir un 8.36% de casos de canceres gastricos de muy pequeno tamano.

RIASSUNTO

Una resezione e' possibile solamente nel 25% dei carcinomi che occorrono all'esame clinico. Negli ultimi 30 anni solamente l'8,30% di tutti i carcinomi sottoposti ad una resezione raggiungeva un diametro inferiore a cm. 2,5. Anche in questo piccolo gruppo di casi, il 3,4% rivelava gia' un'infiltrazione neoplastica delle linfoghiandole.

L'A. giunge alla conclusione, estremamente pessimistica, che sopra 10 ulceri dello stomaco aventi un diametro inferiore a cm. 2,5 (stabilito in base ad un esame comprensivo radiologico, endoscopico, chirurgico e patologico), una di queste ulceri e' carcinomatosa. Per giungere ad una diagnosi precose del canero dello stomaco e' stata necessaria asportare un'ulcera benigna per ogni lesione carcinomatosa. Se questa proporzione non fosse stata seguita come una regola, l'8,36% dei caneri dello stomaco sarebbero sfuggiti perche' in una fase ancora relativamente precoce di sviluppo.

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Selection of Operation to Be Used for Carcinoma in the Several Portions of the Large Bowel*

W. WAYNE BABCOCK, M.D., F.A.C.S., F.I.C.S.
PHILADELPHIA, PENNSYLVANIA

WHILE complete unanimity has not been reached as to the best types of operation for carcinoma developing in the various portions of the large bowel, present tendencies point to crystallization of opinion as to the preferred operation for uncomplicated carcinoma of the abdominal colon. Indeed, for uncomplicated carcinoma of any part of the colon there has been a strong swing toward a one-stage wide resection with end-to-end anastomosis. With thorough preoperative emptying of the intestinal tract and its relative sterilization by antibiotics, these operations are being performed in large numbers with an unprecedented low mortality and freedom from wound infection. A lingering fear of infection in the abdominal wall has led a few operators to practice a delayed closure of the outer layers of the wound. On the other hand, others who have protected the wound edges during the bowel resection and who have avoided leaving materials in the abdominal wall which devitalize tissue or which hold and fix infection, such as catgut, cotton or silk, and have substituted nonirritating metallic sutures and ligatures of small bulk, have had better results and fewer wound complications from a primary closure. There remain some differences of opinion as to use of a side-to-side or end-to-end closure when the ileum is to be united to the colon, as with resection of the right half of the colon. The end-to-end anastomosis with oblique division of the ileum is simpler, and while the lumen of the anastomosis cannot be made as large as with a side-to-side anastomosis, it will, if properly formed, be larger than the ileocecal valve, and quite adequate. The two blind ends formed in the side-to-side anastomosis, especially if made rather long, are subject to distention, and in a number of instances have been responsible for a "blowout," and fatal peritonitis.

A side-to-side anastomosis between the ileum and transverse colon, however, may be considered as the first stage of a two-stage operation for carcinoma of the cecum or ascending colon that is obstructed or that has a walled-off perforation or local abscess, particularly as it is a relatively simple procedure and eliminates the need of a colostomy, but it has the disadvantage of retention of a cancerous loop, subject to distention by the reversed fecal currents of Bond, as well as by the normal peristaltic currents of the intestine. Preferable in many cases is a temporary proximal colostomy or complete division of both colon and ileum, with anastomosis of the proximal end of the ileum to the distal end of the colon. The proximal end of the colon with the distal end of the ileum are then brought out of an abdominal wound to form a double-barreled enterostomy, which can be irrigated and cleansed, alternately using the colonic and then the ileac opening. By keeping this malignant loop empty and free from intestinal contents a rapid subsidence of any inflammatory reaction about the tumor may be achieved and the most favorable condition, under the circumstances, produced for the later en bloc removal of the defunctionalized loop with the adjacent invaded tissue, and for a satisfactory abdominal closure.

The Mikulicz-Paul operation has been largely discarded as a routine procedure for the removal of colonic cancer. Only one large clinic, to my knowledge, has continued to advocate its use. Nevertheless, on the rather rare occasions when a serious complication is found or is developed during an attempted resection of the colon, the Mikulicz-Paul procedure may enable the operator to exteriorize the diseased loop of intestine and to terminate the operation quickly. Otherwise, a one-stage resection with anastomosis has a lower mortality and a much lower morbidity.

After a well performed primary anastomosis and end-to-end closure, about two-thirds of patients are in condition to leave their beds on or before the third postoperative day, and to be discharged from the hospital by the seventh postoperative day. Its most common important complication is ileus, which usually may be prevented or relieved by an aspirating intestinal tube or, for sigmoid resections, an indwelling small rectal tube or catheter lying just below or through the anastomosis. Early the tube is to be frequently cleared by small saline injections, and later, evacuation is produced by the instillation of 30 to 60 cc. of 50 per cent glycerin. An appendicostomy or small tube enterostomy may be required to prevent or relieve an ileus.

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* From the Department of Surgery, Temple University, Philadelphia

In contrast, a patient after the Mikulicz-Paul operation may have learned how to care for his colostomy and be able to leave the hospital at the end of two or three weeks. Should he remain in the hospital, an attempt may be made to close the double colostomy about this time, but some surgeons with large experience have had so many failures that they prefer to send the patient home with his open colostomy for two or three months, after which he returns to the hospital for the closure. If this is successful and he escapes any persistent postoperative wound infection, he may be able to leave the hospital, wearing a supporting belt, after an additional two weeks. But as there is danger in securely closing the wound without drainage at the time the colostomy is closed, the incidence of postoperative incisural hernia is relatively high. When the Mikulicz-Paul operation is used for carcinomas of the cecum or ascending colon, with an associated ileostomy and colostomy, there is an additional danger, for an ileostomy, possibly largely from the heavy loss of fluid and nutritive material, has given a rather high mortality in expert hands. The mortality reported in 1946 from the Lahey Clinic was approximately 11 per cent in over 450 cases.[1] The ileal contents leaking upon the skin often produce a serious and distressing erosion. However, if an intact ileal end projecting 5 to 8 cm. above the skin is formed, this may be covered by a nonconstricting thin elastic latex tube, which may be adjusted to convey the liquid small bowel contents into a collecting bag without spillage.

For carcinoma of the sigmoid, for which the Mikulicz-Paul operation was first introduced, the operation is notorious for the high incidence of recurrence of the carcinoma in the abdominal scar, the bowel contiguous to the anastomosis and the associated mesentery. This is due to the fact that so much viable bowel and mesentery is required to form the apposed arms of the loop, to reach through the abdominal wall and to project as two free ends for 5 cm. or more above the skin, that the operator is frequently unable to remove sufficient of the involved bowel and mesentery. Thus if 6 cm. of bowel and mesentery on each side are required to form the apposed intraäbdominal arms of the loop, 4 cm. to pass through the abdominal wall and 5 cm. to project above the skin, 30 cm. more bowel and mesentery would be retained than if the more radical single stage, end-to-end anastomosis were used. Many patients have died because a more radical type of operation than the Mikulicz was not used.

In the one-stage end-to-end anastomosis, Raymond W. McNealy has particularly emphasized important technical details. By many experiments on lower animals he has demonstrated the advantage of a single row of well placed fine silk sutures. In the dog, these sutures are practically all eventually discharged with the feces. He has emphasized the importance of having vital bowel edges, and of not devitalizing these edges by broad or even narrow clamps, or by closely placed or continuous sutures. Also that a single row of sutures is adequate for the posterior row, but that a second row may be needed to reinforce the lateral edges and the anterior margins in the anastomosis. For the outer sutures I prefer interrupted 35 or 38 gauge stainless steel wire. Partial or even complete obstruction has repeatedly followed the use of multiple rows of sutures in an intestinal anastomosis. In a patient who probably had four rows of sutures in a resection and anastomosis of the sigmoid, an emergency proximal colostomy had been required for postoperative obstruction. Later I found the bowel completely obstructed at the zone of anastomosis. In an anastomosis over clamps there is not only the danger of excessive inversion of the bowel edges but often it is difficult to align the bowel edges accurately, particularly at the lateral margins. If, inadvertently, a lateral margin in one clamp is displaced to the right, and the opposite lateral margin in the opposing clamp displaced to the left, a stricture and partial obstruction at the anastomosis may be formed. In several such cases we have used a colostomy or appendicostomy proximal to the stricture to dilate it. By introducing a catheter, with a funnel at the outer end, into the colostomy, a length of fine silk thread may be washed through the colon and stricture, and out through the anus or a rectal tube. The end of the fine thread may be carried by the current of warm water even through a very small stricture. The thread is then withdrawn fastened to a well lubricated fishline, which in turn is threaded by a strong, pointed needle through the conical tips of rubber catheters or rectal tubes of increasing size, which in succession are carefully pulled through the stricture. If the fishline be left in place for several days it alone will tend to enlarge the stricture or overcome an obstructive angulation.

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[1] Cattell, R. B., and B. P. Colcock: Primary Resection of the Right Colon, Surg. Clin. North America 26:606 June 1946.

The advantage of the open end-to-end anastomosis is that it enables a large lumen to be accurately formed and largely eliminates the danger of a secondary stricture. It may be performed with satisfaction for carcinoma when the bowel has been thoroughly emptied of fecal matter and barium, and the patient adequately prepared with antibiotic measures that sterilize the upper and lower bowel contents. With a low obstructing carcinoma, it may be possible to introduce a rectal tube or catheter, guided by a proctoscope, to a point above the growth and by irrigation to empty and cleanse the proximal colon. But at operation the bowel above the growth will at times be found more or less filled with fecal material or barium. After liberating the segment of bowel and omentum to be removed, the operator may attempt to milk back the intestinal contents and quarantine the area by soft, rubber-shod intestinal clamps. The bowel ends when opened are carefully swabbed out and an anastomosis performed with more or less soiling. In such a case I much prefer a closed anastomosis, excising the segment of bowel by cautery between Furniss clamps, which leave the narrowest margins of devitalized bowel, shirred on small pins, a modification of Donati's clamp method of closing the duodenum. In using the Furniss clamp, or its modifications, care should be taken not to char the bowel edges too close to the pin, as the pin may then fall off or fail to prevent leakage. Also, high frequency currents should not be used to divide the bowel, as these currents may be disseminated by adjacent salt pads and do irreparable damage to distant structures. The pins in the bowel ends are aligned a short distance apart and the posterior row of interrupted 0 silk sutures inserted through the cleared serosa to the submucosa. If exposure of the posterior edges is difficult, this row of sutures need not be tied until the entire row is placed, when the sutures are tied and the ends cut close to the knots. The anterior row of interrupted sutures is then inserted, covering the two pins. The pins are withdrawn and the lateral and anterior margins reinforced by additional fine sutures. This type of anastomosis may be used for carcinomas of the large bowel situated anywhere from the cecum to the peritoneal reflexion on the rectum.

For malignant polyposis the entire colon and upper rectum may be removed, with anastomosis of the end of the ileum to the rectum. Such anastomoses between the ileum and lower rectum I have found satisfactory for ulcerative colitis as well as for diffuse polyposis, provided the sphincters anii are functional.

In 3 cases, after removal of the colon, rectum and sphincters, I pulled the end of the ileum through the perineum for a perineal ileostomy, but the ileal contents proved to be too irritating for the perineum, so that it was necessary to transplant the ileostomy to the abdominal wall in two of the patients.

It is feasible to resect the entire colon in one or two stages without temporary or permanent colostomy. In the two-stage colectomy I consider it of advantage to remove the right half of the colon at the first stage, with end-to-end anastomosis between the ileum and transverse colon. At the second stage, the left colon is removed, the end of the ileum cut free and anastomosed to the rectum. Such anastomoses, with the Furniss clamp, are desirable when there is diffuse polyposis or ulcerative colitis. Thus the patient remains in much better condition between stages than if an abdominal ileostomy is formed at the first stage, with its contamination of the abdominal wall and debilitating loss of intestinal contents.

I have found it quite possible to make the end-to-end anastomosis below the pelvic peritoneal reflection, even to 4 or 5 cm. above the sphincters. These very low anastomoses, especially in obese patients, may be quite difficult, and they may be more subject to secondary leakage.

With resection of the rectum for carcinoma at least 4 cm. of normal-appearing bowel below the tumor should be removed with the specimen. Many thorough studies have shown that the downward lymphatic spread of carcinoma is infrequent beyond 2 cm. below the growth unless the superior lymphatics have become blocked, while evidence of caudal permeation of malignant cells beyond 4 cm. is very rare. Thus the opinion of Miles, which long guided the surgeon, that cancer of the rectum and sigmoid spreads downward as well as it spreads upward and laterally, has been disproved.

Lower Rectal Carcinoma. The area of rectum between 6 and 14 cm. above the perineum is a very common seat of carcinoma. In this segment anastomotic operations may be difficult or insufficiently radical. As the anus and sphincters are not involved by the disease, surgeons have devised a variety of operations with a normal perineal outlet. Many such operations with an approach from below through the perineum, dorsum, sacrum or vagina were introduced during the first quarter of this century. In that of Hochenegg, the sigmoid was telescoped through a section of the lower rectum, which had been denuded of its mucosa. In others an end-to-end union was formed, using Petz clips or other method to avoid soiling; or a pull-through operation after the plan of the Whitehead hemorrhoidectomy was used. These early resections from below, with sphincters preserved, proved to be very unsatisfactory. They were not sufficiently radical, secondary infection was common, and the lines of anastomosis tended to break down, with fecal extravasation, spreading pelvic infections and secondary sinuses and fistulas. Those who, like myself, practiced such operations in their earlier experience have unpleasant memories of undue morbidity and mortality from the rectal resections from below. A few years ago Wangensteen reported a small revival of operations of this type with the advantage of a more modern technic, but also with discouraging complications.

Experience has proved that the resections from below, except for anal cancer, are inadequate and dangerous. To be sufficiently radical, to have adequate information as to the patient's disease, to mobilize the viable bowel sufficiently and widely remove invaded tissue, an abdominal approach is necessary. Technically, the placing of sutures in the bowel leads to complications. The sigmoid and rectum continue to have longitudinal peristaltic contractions after the operation, so that the sutures tear out or cut through, with wound separation and sinus or fistula formation. Fecal discharges, a common source of infection, should not come in contact with the wound until union has occurred. Perineal drains or wound openings in an area where sterility cannot be well maintained should be eliminated. Telescopic operations, in which the upper segment of bowel is pulled through the undivided lower rectum and sphincters, are followed by strangulation, gangrene and ascending infection in the withdrawn bowel. If, however, the sphincters are denuded, as practiced by Harry E. Bacon, then the anal opening may be enlarged sufficiently so that the withdrawn bowel is not strangulated.

It is not surprising that the majority of surgeons turned to the Miles operation, first published in 1908, which was radical yet had a much lower mortality and fewer complications than those with a pelvic approach. Miles, believing in the downward diffusion of rectal cancer, therefore unnecessarily removed the lower rectum, anus and pelvic floor, leaving a large pelvic cavity to granulate slowly, delaying complete postoperative healing for several weeks or months.

He considered it necessary to line the pelvis with mobilized peritoneum and to form a pelvic diaphragm, usually with catgut sutures. But the catgut sutures on this peritoneal surface led to secondary adhesions; and an occasional patient developed obstruction from traction and angulation of the bowel, or from a loop of intestine slipping through an opening between sutures in the pelvic diaphragm. Contrary to general opinion, there is less trouble from pelvic adhesions when the pelvis is left denuded of peritoneum, as shown by the rarity of obstruction from pelvic adhesions in over 400 cases in which we made no attempt to cover the denuded areas with peritoneum.

The most objectionable feature of the Miles operation has been the abdominal colostomy. Some colostomies are quite amenable to regulation by irrigations and conventional care, and may be shown to an admiring audience. Others are capricious, have uncontrollable discharges at inopportune times; and sputter and spatter the patient from head to foot, as well as a wide area of the bathroom, during irrigation. Again there is the relatively dry but odorous type that inopportunely belches gas when the patient bends over or sits down, and renders it embarrassing to practice a profession or to retain a clerical position. I have moved a considerable number of such colostomies through the perineal scar. Irrigations then can be made with the patient sitting upon a toilet seat, without disrobing; discharges of gas have been much less noticeable, intestinal evacuations less frequent; and a number of the patients have developed a warning sensation of an approaching evacuation, enabling them to go without a protective pad.

For carcinoma of the sigmoid and upper rectum, wide resection and end-to-end anastomosis should have first consideration. When this is not feasible, and for cancers at least 4 cm. above the sphincters, a radical pull-through type of operation should be considered.

For cancer of the rectum within 4 cm. of the sphincters or 6 cm. of the perineal skin, a Miles type of operation may be elected. Personally, I prefer an abdominoperineal resection with a perineal colostomy because this has been preferred by the patients, and requires less care than an abdominal opening. As to this, patients who have the modern perineal colostomy or who have had an abdominal Miles colostomy transferred to the perineum will agree, although it may not yet have general surgical approval.

For epitheliomas limited strictly to the anus, a wide perineal resection with perineal colostomy may be adequate, as there seems little tendency for these growths to spread upward into the pelvis and abdomen. If a large perineal hernia or prolapse follows, as is not uncommon, the patient may prefer an abdominal colostomy, which also may develop a troublesome hernia and prolapse, but with more tissue for adequate repair. For a large perineal hernia I have implanted a support of stainless steel mesh having a central hole through which the bowel is passed to the skin.

The question as to the desirability of removing the lymphatics running from the anus, on the medial sides of the thighs, to the medial lymph nodes of the groin is to be considered with anal epitheliomas. Invasion of the lymphatics has, in my limited experience, indicated an advanced and ineradicable disease, but this additional procedure may be desirable in certain cases.

In the pull-through operation which I have practiced with minor variations since 1930, the abdomen is opened under spinal anesthesia, through a lateral incision along the outer border of the left rectus or, if there is a median scar, by excision of the scar. The preliminary intraäbdominal examination from diaphragm to pelvis indicates whether the operation will be radical or palliative. In the presence of ineradicable metastatic nodules in the liver or elsewhere, although the same operative technic is usually employed, the operation can be only palliative. In any case, every effort will be made to avoid a colostomy. The small intestines and omentum are walled off by moist saline gauze pads in the upper abdomen. The left lateral leaflet of the sigmoid is divided wide of the bowel. The left spermatic or ovarian veins and left ureter are freed and displaced to the left; the hand introduced under the *sigmoid, and* the sigmoid, sigmoid mesentery, rectum and adjacent peritoneum elevated and separated from the underlying great vessels and sacrum to the coccyx below, the ureter on the right side, and the third, fourth and fifth lumbar vertebrae above. The mesentery of the sigmoid, especially about the inferior mesenteric vessels, is palpated for enlarged and indurated lymph nodes. An incision is made through the right peritoneal leaflet medial to the ureter, and is extended across the rectum through the vesical or uterine reflection to join the peritoneal incision on the left side. A finger introduced under the upper medial edge of the peritoneal incision on the right side hooks up the superior hemorrhoidal, inferior mesenteric and the first and often the second sigmoid vessels, which are clamped, divided, and doubly ligated with transfixion, using 0 chromic catgut, which is securely seated in the groove left as the curved hemostatic clamp is removed.

The rectum is separated anteriorly from the seminal vesicles and prostate, or the cervix and vagina, and the lateral rectal ligaments divided wide of the bowel, with the small middle hemorrhoidal arteries, which may not require ligation. Care should be taken to oid the anterior sacral veins, which are diffi-lt to ligate, as well as the obturator veins t the sides of the pelvis. The mesentery of the sigmoid is spread out and usually divided between the vascular arcades on a line to the midsigmoid. Bleeding vessels are tied with fine silk, and the lower edge of the upper segment of sigmoid tested for vascularity by incising small vessels on its wall; and also for sufficient length, usually about 12 cm., to reach from the promontory of the sacrum through the anus. If there is insufficient length, the lower part of the descending colon is liberated, with division of its lateral peritoneal leaflet. A tape of folded gauze 1 m. long is tied about the midsigmoid at its lower zone of vascularity, and the ends of the tape packed against the floor of the pelvis to reduce oozing and serve as a guide in the perineal part of the operation. Should there be a malignant polyposis involving also the descending colon, this portion of bowel, with the splenic flexure and terminal portion of the transverse colon may also be liberated with division of the inferior mesenteric vessels and sufficient of the gastrocolic omentum to permit the terminal portion of transverse colon to be brought through the anus.

The abdominal wall is closed with layer sutures of 35, 32 and 30 gauge stainless steel wire, with a sump drain running from the pelvic floor through or lateral to the abdominal incision.

The perineal phase is immediately started with the patient in the lithotomy position. The rectum is wiped out and carefully packed with gauze wet with 3.5 per cent tincture of iodine, and a midline incision made through the posterior border of the anus and sphincters to the base of the coccyx. With curved scissors the rectum is divided just above the sphincters and the upper margin grasped in hemostats for traction. The midline incision is deepened into the pelvic cavity along the right side of the coccyx, the finger introduced and the levatores anii on each side elevated from the rectum and divided wide of any infiltrated tissue, the fascial interval between the urethra, prostate and rectum is entered and the bowel withdrawn as any remaining attachments are divided. If infiltrated, the prostate, vagina, uterus, bladder or other pelvic organ is resected or liberated and withdrawn, attached to the bowel. The withdrawn bowel is wrapped in a towel and laid over the pubis, and the perineal wound and pelvis are inspected with the aid of a gynecologic trowel. Bleeding points are ligated and the pelvic floor and perineum closed in about four layers with interrupted sutures of 32 gauge alloy steel wire without drainage. The withdrawn sigmoid should lie loosely in the wound to allow for swelling and is not sutured to any adjacent structure. Dressings are applied and the sigmoid divided about 6 to 10 cm. from the skin. A week or ten days later, primary union having occurred, the protruding bowel is again amputated, this time about 2 cm. beyond the skin, with careful hemostasis. The bowel then spontaneously retracts within the anus and forms a union just above the sphincters. In the after-treatment, care should be taken to keep the opening of adequate size until any tendency to stricture formation has passed. For the first two months a quickly acting saline laxative is given to empty the intestinal tract every second or third morning. Later, enemas may be used or the patient may establish a regular habit.

The sump drain gives the earliest sign of ileus, a sudden flow of clear serum being a signal for immediate gastrointestinal decompression. With an end-to-end resection, slight leakage from the anastomosis is early shown by odorous evacuation from the sump drain. If the leakage is slight and without definite abdominal and general symptoms, the sump drainage is continued for six or seven days for the establishment of a drainage tract, and is then withdrawn, with immediate reinsertion of a small perforated catheter which later is gradually withdrawn as the small fistula closes. If there is evidence of leakage into the general peritoneal cavity, the wound should be immediately opened, the anastomosis separated, the proximal end brought through the wound for a colostomy, the distal end exteriorized or isolated by a gauze drain, the distal end of which is passed through the anus while the proximal portion covers the contaminated pelvic floor. The abdominal wound is lightly closed with through-and-through 30 gauge wire sutures and the gauze drain removed through the anus five or more days later.

With a pull-through type of operation, if the bowel necroses or leaks back into the pelvis, with beginning peritonitis, the wound should be opened immediately and the terminal bowel pulled up into the wound for a colostomy, and a gauze drain placed and brought out through the perineum as just described. After several months it may be feasible again to establish an anastomosis or perineal outlet.

It would seem that for sigmoid and most rectal cancers we may now well discard the mutilative and unnecessary parts of the Miles operation, the colostomy, the ablation of the anus and pelvic floor, the pelvic diaphragm and yet retain or add to the really radical features of his operation. Especially desirable is a wide removal of pelvic peritoneum about the concer where we have found hidden recurrence after the Miles operation. For the less experienced operator dealing with growths above the pelvic floor, the lower rectum may be divided between clamps, the rectosigmoid with attached adjacent peritoneum, mesentery and lymphatics exteriorized, the pelvic floor covered by a folded strip of gauze, the end of which is pushed through the anus, and the abdomen closed without other drainage, following which the redundant colostomized bowel is resected. This relatively simple operation leaves a segment of rectum with the anus, enabling early dependent drainage, and later palpation of the pelvic floor for recurrence, and also the possibility of a later anastomosis of the colostomy to the terminal rectum.

SUMMARY

For carcinoma of the abdominal colon a single wide resection of bowel and adjacent mesentery, with end to end anastomosis, is popular. With the bowel empty and asepticized by antibiotics, an open type of operation with one or two rows of interrupted sutures has given good results. A few operators, fearing contamination of the abdominal incision, practice delayed closure of the abdominal wall Even with ileocolic anastomoses, an end to end is supplanting the side to side anastomosis. With obstruction not relieved by simple methods, a preliminary appendicostomy, cecostomy or transverostomy is used. In selected cases an appendicostomy can rapidly be dilated to size 28 F. by successive catheters of increasing size. With a complicated carcinoma a primary eliminative operation is done, the bowel being first divided and united well outside the malignant segment, while the ends of the malignant section are exteriorized for irrigation and later removal of the defunctionalized segment. The Mikulicz-Paul stage operation, insufficiently radical in the sigmoid area, should properly be discarded except to relieve an acute emergency. Anastomosis where the bowel has not been well emptied is best accomplished by a closed anastomosis, for which the Furniss clamp has the advantage of producing only a small inversion of the bowel ends. For diffuse polyposis the colon may be removed in one or two stages, with anastomosis of the ileum to the rectum or lower sigmoid. There is an advantage in doing the stage operation, with primary hemicolectomy and anastomosis rather than a temporary ileostomy. Rectal anastomoses below the peritoneal reflection are more difficult and more subject to leakage. The abdominoperineal pull-through operation is preferred for carcinoma of the rectum and rectosigmoid situated at least 6 cm. above the anus. Suture anastomosis or the perineal or sacral approach is not approved for the low resections. The bowel is not sutured to the skin, but a 10 cm. segment is left protruding from the split anus for one week. Unnecessary features of the Miles operation in most cases are removal of the pelvic floor, pelvic peritonealization and the formation of a pelvic diaphragm. For growths within 6 cm. of the anus, a wide resection of the pull-through type, with perineal colostomy, is preferred. For carcinoma with ineradicable extension, radical excision is used except in terminal states. A sump drain, used in all large intestinal resections gives the earliest indication of leakage, ileus or other wound complications.

SOMMAIRE

Pour le carcinome du côlon, une large résection de l'intestin et du mésentére avoisinanat, suivie d'anastomose bout-á-bout est populaire. L'intestin étant vidé et ayant été aseptisé par l'emploi d'antibiotiques, l'opération avec un ou deux rangs de sutures interrompues nous donne de bons résultats. Quelques opérateurs craignant la contamination de l'incision abdominale, adjournent la fermeture de la paroie abdominale. Même pour les anastomoses iléocoliques, l'anastomose bout-á-bout est en train de remplacer l'anastomose latérale. Quand l'obstruction n'est pas soulagée par les méthodes élémentaires, on a recours á l'appendicostomie, á la cecostomie ou á la transversostomie préliminaires. Dans certains cas une appendicostomie permet une dilatation rapide jusqu'á 28 F. par l'emploi succesif de sondes de calibre augmentant. Avec un carcinome compliqué, on fera premièrement une opération éliminative, en divisant l'intestin et en l'unissant en dehors du segment malin. Les extrémités du segment malin sont extériorisées pour irrigation et pour enlèvement tardif total du segment malin. L'opération Mikulicz-Paul est insuffisament radicale pour la région sigmoïde et ne sera pratiquée que pour soulager des symptômes très urgents. L'anastomose, quand l'intestin n'a pas été complétement bien vidé, est plus facilement accomplie par l'union fermée pour laquelle le clamp Furniss a l'avantage de ne produire qu'une légère inversion des bouts intestin-aux. Pour la polypose diffuse du côlon, l'opération se fera en deux étapes. On enléve le côlon et on unira l'iléum au rectum ou á la partie terminale du sigmoïde. Il y a un avantage d'opérer en deux étapes une hémicolectonie primaire et une anastomose, plutôt que de pratiquer une iléostomie temporaire. Les anastomoses rectales au-delá de la réflexion péritonéale sont plus difficiles et sont suivies souvent d'écoulément. L'opération abdominale-périnéale est préférable pour le carcinome du rectum et du recto-sigmoïde situés au-delá de 6 Cm. de l'anus. La suture anastomose ou l'approche périnéal ou sacral, n'est pas approuvé pour les résections basses. L'intestin n'est pas suturé á la peau mais on laisse un segment de 10 Cm. faire saillie á travers l'anus pendant une semaine. Les mesures inutiles dans la plupart des cas de l'opération de Miles, sont l'enlèvement du plancher-pelvique, la péritonéalisation pelvique et la création d'un diaphragme pelvien. Pour les tumeurs ne dépassant pas 6 Cm. de l'anus, une résection large et suivie de colestomie périnéale est préférable. Pour les carcinomes avec extension inéradicable, l'emploi de l'excision très large excepté dans les états terminaux est indiquée. Le drainage employé dans les larges résections intestinales nous donne les premières indications d'écoulement, d'obstructions et d'autres complications de la plaie.

SUMARIO

El tratamiento mas popular del cancer del colon abdominal es la reseccion del segmento afectado con anastomosis directa de los extremos del colon. Con el colon vacio y aseptico por el uso de antibioticos da buenos resultados la sutura del intestino con dos lineas de costura. Ciertos cirujanos por el miedo de que haya contaminacion de la

incision de la pared del abdomen, practican su sutura mas tarde. En casos de obstruccion intestinal que no se puede controlar con metodos mas simples, la apendicostomia o la cecostomia o aun la colostomia del transverso se usa con buenos resultados. En casos seleccionados una apendicostomia se puede rapidamente dilatar hasta obtener un calibre de 28 F, usando cateteres de diferente tamano. En casos de carcinoma complicados el intestino primeramente se divide y luego se une muy por fuera de la seccion invadida por el cancer; mientras tanto este segmento cancerosos es resecado y sus extremidades son exteriorizadas para ser irrigados y con el tiempo se reseca el segmento asi desfuncionalizado.

El procedimiento de Mikulicz-Paul no es suficientemente radical en la cirujia del sigmoideo por lo tanto solo se debe de practicar en las emergencias agudas. La anastomosis de segmentos intestinales que no se pueden evacuar completamente se puede hacer con el uso del forceps de Furniss que tiene la ventaja de producir una pequena inversion de los terminos del intestino En el tratamiento de la poliposis difusa del colon este se puede resecar en una o dos etapas con anastomosis del ileo al recto o al sigmoideo. Hay ciertas ventajas en ejecutar una hemicolectomia primaria con anastomosis en lugar de una ileostomia temporal. La anastomosis rectal por debajo de la refleccion peritoneal son mas dificiles y hay mas peligro al escape. En el cancer del recto y recto sigmoideo situado por lo menos 6 cms. arriba del ano la reseccion abdomino-perineal con deslizamiento del segmento superior es la operacion mas preferible. El intestino no es suturado a la piel, pero un segmento de 10 cms. de largo se deja que protruda por una semana. Los procedimientos innecesarios de la operacion de Miles, en la mayoria de los casos, son la reseccion del suelo de la pelvis, y la peritonealizacion y formacion de un diafragma pelvico. En canceres que estan complicados por metastasis o extensiones iradicables, la excision radical se usa, con excepcion de las casos que ya estan en el estado terminal. El uso de un dren en todas las resecciones del intestina largo, dan muy temprano indicaciones de escape, o de la aparienca del ileus o de otras complicaciones de la herida.

RIASSUNTO

L'operazione piu' comune per il cancro del colon e' la resezione dell'intestino e del mesentere adiacente, con anastomosi termino-terminale. Buoni risultati sono stati ottenuti con quest'operazione, avendo svuotato e disinfettato—in anticipo—con antibiotici l'intestino. Pochi chirurghi, nel timore di una contaminazione dell'incisione, ricorrono ad una chiusura secondaria delle pareti addominali. Le anastomosi termino-terminali vanno sempre piu' sostituendosi — anche nelle anastomosi ileo-coliche—alle laterali. Quando i comuni metodi non riescono a superare l'ostruzione intestinale, un'appendicostomia, una cecostomia, od una transversostomia preliminare trovano un'indicazione. In taluni casi un'appedicostomia puo' essere rapidamente dilatata con una serie crescente di cateteri fino a raggiungere un diametro di 28 F. Nei carcinomi complicati e' opportuno ricorrere ad un'operazione preliminare allo scopo di sezionare ed allacciare l'intestino ad una certa distanza dal tumore, esteriorizzando in seguito ed asportando poi in un secondo tempo il segmento colpito.

L'operazione a tappe di Mikulicz-Paul, la quale non e' abbastanza radicale nella zona del sigma, puo' essere eseguita solo allorquando insorga una complicazione acuta.

Nelle poliposi diffuse il colon puo' essere asportato in uno o due tempi, con anastomosi dell'ileo al retto od alla porzione piu' bassa del sigma. Vi e' un certo vantaggio nell'eseguire l'operazione in piu' tempi, con un'emicolectomia iniziale ed anastomosi dell'ileo, piuttosto che un'ileostomia temporanea. Anastomosi rettali al disotto della plica peritoneale offrono maggiori difficolta' e sono piu' facilmente soggette a diffusioni del contenuto intestinale.

L'operazione addomino—perineale e' preferibile nei cancri del retto a del retto-sigmoide situati per lo meno 6 cm. al di sopra dell'ano. Nella resezioni basse, la via perineale o sacrale non e' consigliabile, come non sono indicate le anastomosi con suture.

Surgical Management of Diverticulitis of the Sigmoid*

HARRY E. BACON, M.D., F.A.C.S., F.I.C.S., F.R.S.M.,†
AND EDWARD R. McKAY, M.D.‡
PHILADELPHIA, PENNSYLVANIA

WHILE it is generally conceded that a good portion of patients suffering with diverticulitis will respond to nonsurgical management and, further, that the complications of this disease require surgical intervention, there still exists lack of agreement as to the indications for resection. The purpose of this discussion is to review our experience with diverticulitis and particularly to rationalize its surgical management.

Diverticulitis is the term applied to a morbid condition characterized by the presence of sacculations along the extraluminal wall of the gastrointestinal tract, these having undergone inflammatory change. The literature is replete with references to this subject, especially during the past quarter century. As early as 1700, Littre mentioned "Diverticular Hernia" while Riolan, Gunz, Schroch, and Sommerling reported cases at a later date. The first notable description was that given by Cruveilhier in 1849; shortly thereafter published works by Virchow and others appeared. Graser in 1889 emphasized the importance of the disease, while Berr in 1904 gave consideration as to its etiology and classification. In 1907, Moynihan presented a scholarly paper on its mimicry of cancer of the colon. The same year Mayo, Wilson and Griffin reported five cases in which a portion of the sigmoid was excised. An excellent description of peridiverticulitis, its pathology, pathogenesis and complications followed shortly thereafter.

The term diverticulum is derived from the Latin *diverto,* "I turn aside." The suffix, culum, when appended to the verb indicates the diminutive and may be freely translated as "a small turning aside." This aptly describes the condition despite its brevity. The lesions do not assume the characteristics of an independent entity, but appear rather as projections which have "turned aside" for a variable distance from the parent bowel.

INCIDENCE

These blind pouches may occur at any site, but their greatest incidence is in the large bowel. According to Abel, in 85 per cent of the cases, the site of election is the flexure of the sigmoid colon. Unless otherwise anatomically qualified herewith, diverticulitis is accepted to mean sigmoidal diverticulitis.

The incidence of diverticulosis in all probability will never be accurately determined because many individuals in whom the lesions exist remain in perfect health and are not examined. Consequently, some observers have declared that the presence of diverticula in the intestine is only of academic interest and merits no greater attention than that accorded the uncomplicated appendix or gallbladder. While it must be admitted that diverticulosis is essentially inocuous, recent statistics indicate it to be a potential site of inflammation not to be disregarded. Diverticula of the intestine were observed in 6.9 per cent of a series of 447 cases which came to necropsy at the Mayo Clinic. Roentgenologically, a study of 2,747 cases also revealed the presence of diverticula in the proportion of 7 per cent. The similarity of the statistical result in both these instances precludes a coincidence and may well afford the true incidence.

The transition from diverticulosis to diverticulitis has been variously reported by different authors as from 11 to 35 per cent. In the light of these statistics, it is reasonable to assume that the transition from diverticulosis to diverticulitis may be considered approximately from 20 to 25 per cent.

The sex of the individual does not play as important a role in diverticulosis as was previously believed. Earlier ratings gave a higher incidence in males, but subsequent investigations reduced the ratio to approximate

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† Professor and Head, Department of Proctology, Temple University Medical School, Philadelphia.

‡ Resident in Proctology, Temple University Medical School, Philadelphia.

TABLE 1. AGE DISTRIBUTION OF SIGMOIDAL DIVERTICULITIS.

Age	Cases
21–30	3
31–40	9
41–50	16
51–60	38
61–70	26
71–80	9
81–90	3
Total	104

equality. According to Ochsner, diverticulitis attacks the male more frequently in a ratio of 2.75:1. Similarly, in a series of cases, now asymptomatic, giving a previous history of previous diverticulitis, males again exceeded females, but in a lesser ratio—1.25:1. It is reasonable, therefore, to adopt the working premise of diverticulosis attacking both sexes equally and that only in the presence of diverticulitis and its complications does that balance change to a preponderance of males.

Diverticulitis is generally considered a disease of the latter decades of life, although it has been known to occur earlier. Some clinical observers have reported cases below the age of 50, but none under the thirtieth year. The great incidence of diverticulitis has been established between the ages of 50 and 60, reaching a maximum at 59. Thereafter, a progressive decrease in the number of cases has been observed. In the authors' group, there were three instances occurring between the twenty-first and twenty-fifth year.

It is important, however, to bear in mind that diverticulitis can and does occur in the young. There are references in the literature which report the disease to have occurred in children whose ages ranged from 9 months to 19 years. Probably the youngest case on record is that of an eighteen-hour-old infant. In some of these cases the lesions were situated in locations other than the sigmoid, while in others the process was definitely sigmoidal.

The weight of evidence thus indicates quite clearly that while the majority of cases of diverticulitis occur in the fifth decade of life, there are exceptions to this rule which must not be ignored.

Association of Diverticulitis and Carcinoma. Early observers were of the opinion that diverticulitis was a predisposing factor in the development of carcinoma of the intestine. The prevailing opinion at present is at variance with that belief. Ochsner and Bargen found malignancy of the colon in but 6 per cent of their cases in whom diverticula were known to exist (13 cases). In only 7 of these was malignancy found in the same portion of the colon harboring the diverticula. Rankin and Brown found carcinoma in only 4 out of 227 cases of diverticulitis and concluded that the relationship between carcinoma and diverticulitis was incidental rather than actual. Since both diverticulitis and carcinoma of the intestine occur in the latter decades of life in the majority of cases, it is reasonable to expect some percentage of coincidental involvement either in the same area or remotely situated.

ETIOLOGY

There is no unanimity of opinion as to the exact nature of the factors entering into the development of diverticula of the bowel, although much interest and speculation have centered around their etiology. Under embryologic factors may be included the true or congenital diverticula with traction upon the walls as the bowel in its development grows away from the vessels. Among the factors involved are: (1) Anatomic: narrow bowel lumen at rectosigmoid, horizontal plane, or pelvic sigmoid, consistent with stasis; arrangement of longitudinal bands and lack of complete encirclement; presence of sacculations due to shortness of taenia compared to the bowel; defect in circular muscle coat created by entrance and exit of blood vessels; the presence of appendices epiploicae along anterior longitudinal band; distention of the veins by passive congestion. (2) Physiologic: sensitivity of the sigmoid; peristalsis; spasm of circular muscle. (3) Pathologic: adhesions causing traction: diverticula; muscle deficiency as the result of degeneration; atrophic changes; avitaminosis. (4) Physical: pulsion—increased pressure from within; traction—pulling from without.

At this time when much is being said and written on psychosomatic medicine, it seems expedient to mention that Willey, some two decades ago, stated that he had no doubt but that there was a close relationship between depressing emotions and pathologic change in the large bowel and that, in the creation of the diverticulitis, a sensitive and impassioned temperament was a powerful predisposing factor. Synnott, however, observed diverticulitis rarely occurring among the insane. Willard and Bockus do not believe that diverticula are prone to develop in colons which are the seat of neuromuscular irritability. It is true for the most part that we are dealing with theories, yet there does seem to be sufficient data extant to state that the cause in all probability is a combination of factors due principally to an increased intraluminal pressure—pulsion—and a decreased resistance to the pressure created.

Diverticula are defects whether they are congenital—developing in utero—or acquired—developing after birth. Ordinarily, diverticula are classified as true (congenital), or false (acquired), the former being composed of all the bowel coats, viz., mucosa, submucosa, muscularis and serosa, the latter being devoid of some of these coats, usually the muscularis. The latter impression is almost universal today, representing the accepted classification. Congenital type: Diverticula falling into this category usually are single, occur at birth, possessing all the coats inherent in the parent bowel. An excellent example of this type is the Meckel's diverticulum attached to the ileum approximately 3 or 4 feet above the ileocolic junction. Acquired type: Diverticula of this class are generally accepted to be herniations of the mucosa and submucosa through congenitally weak portions of the bowel wall. These "weak portions" exist at a point where the blood vessels pierce the muscle coats. With this background, an increase in intraluminal pressure is considered adequate as an exciting factor for the initial development of the herniation. The diverticula usually are multiple and, as can readily be seen, are composed merely of mucosa, submucosa and serosa.

The mechanism described by Edwards for the formation of acquired diverticula of the intestine is indeed adequate. He emphasized the "weak spots" in the intestinal wall at the point where the blood vessels gain entrance. He amplified this by pointing out that these vascular outlets become smaller during the period of contraction of the bowel. Conversely, they become larger during the period of relaxation. If contraction of two portions of the intestine occurs with a relaxed segment between them, the bilateral pressure will force the mucosa into the enlarged vascular outlets in the relaxed segment thus producing the initial herniation which may then progress to full diverticula formation.

As the diverticula develop they expand into saclike structures of varying size, but they retain the small point of their origin which acts like a collar. This is an important factor in the subsequent development of diverticulitis. Fecal material enters the sac through the constricted neck and is confined therein by the small opening. The diverticula have no muscular coat and cannot eject the offending foreign material. As a result, the foreign body becomes inspissated and stagnant, soon ulcerating the lining of the sac and sets up an infection assuming either a mild or severe character.

A diverticulum is a bottle-shaped process presenting a narrow neck and body, or sac. In the congenital variety, the wall of the diverticulum is composed of all the layers of the bowel wall, whereas in the acquired type there is a thinning out or absence of the circular muscle layer causing herniation of the mucosa and submucosa through the muscle. The number is variable, ranging from one to several hundred. Ordinarily, they are almost spherical in shape, measuring in diameter approximately 2 mm. at the neck and from 6 to 10 mm. at the body. Diverticula of very large size have been reported. These are to be found from the pharyngoesophageal articulation to the anorectal line, although the sigmoid portion of the colon is the favored site. Approximately 85 per cent of diverticula are found in the descending colon and sigmoid. Infrequently, the rectum is involved, although several cases have been cited.

PATHOLOGY

The pathology of diverticulitis is essentially that of inflammation and infection. Any stage may be encountered, from a mild inflammation to gangrene. Abscess formation, perforation, peritonitis, fistula formation into adjacent organs and obstruction from sigmoiditis and peridiverticulitis may be anticipated. The initiation of secondary inflammatory changes depends upon retention of fecal material in the diverticula. It is axiomatic that this should occur most frequently in the sigmoid because the fecal stream is more solid in that location than elsewhere in the gastrointestinal tract. The most common lesion encountered is an inflammatory process localized in the diverticula. All of the elements of inflammation are present, producing a picture not unlike that seen in acute appendicitis. Additionally, there is a characteristic extension of the inflammatory process for a variable distance in the wall of the bowel. The inflammation may subside under *nonsurgical care and undergo resolution* or it may progress to abscess formation. The abscess may remain static until relieved by operation or it may rupture. If it ruptures into the lumen of the bowel to which it is attached, adequate drainage may result, with a corresponding spontaneous cure. Should it rupture into the peritoneal cavity, peritonitis with all its attendant complications will result.

Extension of the inflammation into adjacent organs fortunately is rare. The resultant fistula usually involves the urinary bladder due to its anatomic proximity. It may, however, involve a neighboring loop of bowel or it may dissect laterally and forward in the iliac fossa to open ultimately on the skin of the left lateral quadrant of the abdomen. The latter extension is quite rare. The fistulae seen in this location usually follow an operation for drainage of an abscess, particularly when the openings of the diverticula have not been *adequately eliminated*.

The recurrent type of diverticulitis may follow a previously acute process which had *undergone spontaneous resolution*, indicating a reinfection of the diverticula. Similarly, recurrence may follow the closure of a colostomy which had previously been established for its cure. For many years a proximal colostomy, usually located in the transverse colon, was considered adequate therapy for acute diverticulitis This was maintained until all evidence of inflammation had disappeared and sigmoidoscopic examination was normal; the colostomy was then closed. More recently, a fairly large percentage of the cases so treated returned with a recurrence of their diverticulitis. As a result, ultimate reliance is no longer accorded colostomy alone but this procedure is now considered merely a valuable preliminary adjunct to resection.

A predominant feature of chronic diverticulitis is a fibrotic infiltration of the wall of the diverticula and parent sigmoid. As a result, the bowel wall becomes thickened, encroaching on the lumen. Ultimately, complete obstruction may ensue. The fibrosis extends for a varying distance cephalad and caudad to the original diverticula and, in tapering off, produces a sausagelike or spindle-shaped mass, considered to be characteristic of chronic diverticulitis. As such, it is used as an aid in differentiating it from the short, abruptly demarcated lesion of carcinoma, although both may occur coincidentally. Fibrous adhesions not infrequently form around the lesion (peridiverticulitis) and attach themselves to the adjacent viscera. Acute inflammatory processes may form in the fibrotic wall of the bowel or in the mass of adhesions. The likelihood of their rupture, however, is small and they are usually discovered at operation or necropsy.

SYMPTOMS

It is almost universally accepted that uncomplicated diverticulosis produces no symptoms. As a result, a clinical diagnosis is often impossible. Willard and Bockus studied the condition with care and arrived at a syndrome which they believe manifests diverticulosis. The syndrome includes an intermittent diarrhea alternating with episodes of constipation, epigastric pain or distress, flatulence and occasionally generalized abdominal pain. The value of this syndrome remains to be proved. It parallels too closely those symptoms attributable to any unstable colon to be recognized as pathognomonic of diverticulosis. If these symptoms become more definite, they are probably due to a mild degree of diverticulitis, rather than diverticulosis, since it is manifestly impossible by clinical means to rule out a small, hidden, infected sac. In diverticulitis, the symptoms vary in direct proportion to the severity and extent of the inflammatory process. Pain in the left lower quadrant of the abdomen, low grade pyrexia, slight leukocytosis, flatulence, disturbed bowel function, as constipation and diarrhea, a palpable tender sigmoid, nausea and pneumaturia are the composite cardinal symptoms. In our group of 104 private patients, the following symptoms were noted:

Pain (abdominal)	84	(80.7%)
Constipation	73	(70.1%)
Diarrhea	11	(10.5%)
Constipation alternating with diarrhea	13	(12.5%)
Bleeding	17	(16.3%)
Palpable mass in sigmoid (noted by patient)	20	(19.2%)
Pneumaturia	16	(15.3%)

Pain usually is present in the left lower quadrant and is comparable to the sensation accompanying appendicitis and is a fairly constant complaint. It may vary from a slight discomfort to severe colic. The latter is due to an associated spasm of the bowel musculature. The site of the pain does not always correspond with the location of the maximum diverticular pathology, as revealed by the roentgenogram. It does, however, correspond very often with the points of greatest muscular spasm. As a rule, the pain is characterized as a dull ache in the left lower quadrant which may be referred to the back.

In a study of 104 cases of diverticulitis, 73 or 70.1 per cent gave a definite history of constipation; 11 a history of diarrhea and 13 reported constipation alternating with diarrhea. The symptom-complex, however, is not specific, being too unreliable for pertinent diagnosis.

Fever, chills and leukocytosis are merely indicators of the degree of infection. They occur more particularly in acute diverticulitis and its complications and may be absent in the chronic (fibrotic) form. In the presence of abscess and peritonitis, nausea and vomiting are not uncommon. In obstruction due to chronic diverticulitis, it may appear as a late symptom.

The passage of blood from the bowel in diverticulitis is an inconstant factor. It has been reported in widely separated clinics to have occurred in from 7 to 20 per cent of the cases investigated. The degree of bleeding has varied from slight amounts to massive hemorrhage. Some of our more competent observers ascribe little significance to it, preferring to believe that proctoscopic examination will reveal other causes for the phenomenon. They do admit, however, that bleeding has occurred in some of their cases for which they could find no other explanation despite the most careful study. Other observers, equally competent, have adopted the view that rectal bleeding, while it cannot be accounted for by an associated lesion, should be regarded as a symptom of diverticulitis. The mechanism of the phenomenon is unknown. One report suggested that it may have been due to a ruptured vessel in the thinned wall of a diverticulum. That theory, however, is didactic rather than practical. Our view coincides with that of Linde that, while hemorrhage in diverticulitis is neither a predominant nor constant factor, it would be unwarranted to disregard it entirely. The appearance of mucus in the stools has been noted in a small percentage of cases. It is no more characteristic than the mucus associated with constipation, occurring too infrequently to be endowed with any diagnostic significance.

In most cases of diverticulitis tenderness and rigidity are present in the left lower quadrant directly over the lesion. Occasionally, they may reach their maximum intensity over the area of associated colonic spasm. The degree of tenderness and muscular rigidity is increased with the development of any abscess, becoming generalized in the event of perforation and peritonitis.

Palpation of a tender mass in the left iliac fossa is a fairly reliable sign of diverticulitis, but in approximately 80 per cent of cases no mass can be felt. It is usually sausagelike or spindle-shaped, immovable and quite tender, and must be differentiated from carcinoma.

There are no specific symptoms to indicate either an imminent or actual fistula into a neighboring loop of bowel. The established fistula usually is uncovered by the roentgenogram or by operation. A fistula into the urinary bladder on the other hand, as a rule will serve premonitory notice of its presence. A history of pain, frequency, burning and nocturia warns of adhesion to the bladder. The passage of flatus on micturition is strong presumptive evidence that a colovesical fistula is present. When the fistula becomes established, the urine will become foul and a progressively severe cystitis develops. The presence of fecal material in the urine has been noted in a few of our cases.

DIAGNOSIS

The diagnosis of diverticulitis is not always simple. The symptoms, already enumerated, vary widely in their intensity and one or more of the signs may be absent. The opaque enema provides the most reliable means of establishing a diagnosis. Eggers has stated that "the most valuable symptom is to bear a diagnosis of diverticulitis in mind." Rosser's diagnostic formula is apt. A combination of low grade pyrexia, tenderness in the left lower quadrant with or without the presence of a palpable mass, and sigmoidoscopic evidence of fixation of the lower colon, especially in an individual over fifty, are indications that careful radiographic studies of the colon are in order. In recent years, more frequent and efficient use of the sigmoidoscope has yielded considerable diagnostic information. A group of signs has been evolved for the recognition of diverticulosis and diverticulitis which has proved of value. Through a correlation of certain signs Brue found it possible to diagnose the lesion in 65 per cent of his cases. The signs are: (1) Limited mobility of a segment of the bowel associated with limited mobility of the adjacent structures. (2) Angulation of the bowel. When present this feature occurs at the point where the inflammatory process involves the colon and it is practically impossible to pass the instrument beyond it. (3) Reduced lumen and adherent mucosal folds. The former is due to contracture of the fibrous tissue which has infiltrated the wall of the bowel. It follows inevitably that, as the contraction progresses, the mucous folds are crowded together and become adherent. It is not unusual for the folds to become edematous. (4) Sigmoidal sacculations. These are represented as shallow pouches or depressions which may extend partially or completely around the wall of the bowel. In a mobile sigmoid which bears no evidence of inflammatory disease, ridges separating the pouches can often be seen. They may represent a prediverticular state and are best visualized when the bowel is distended with air. A similar observation was made 20 years prior by Spriggs and Marxer. They studied a large series of roentgenograms of the colon and described a "prediverticular state" in which normal segmentation of the bowel was replaced by a "ragged outline of little convex irregularities." (5) Actual view of the openings of the diverticula through the sigmoidoscope. While these signs may be seen separately, they usually occur in combination. It may not be possible to make a definite diagnosis by use of them alone, except when the diverticula are actually visualized. The barium enema is the most accurate and effective agent of diagnosis at our disposal. Its greater use today is responsible for the markedly increased number of patients in whom the lesions are now demonstrated. While the opaque meal may show the diverticula in the colon, it is not as efficient as the opaque enema. Consequently the barium enema is now used almost universally, either alone or followed by injection of air. The latter, or double contrast method, is preferable in that it gives the diverticula a more positive outline.

It is of vital importance, however, to realize that the opaque enema is not infallible. By reason of spasm or cicatricial constriction, the barium may not enter the sacs and a negative report will result. If the symptoms persist, reexamination should be insisted upon. It is equally vital to realize that a roentgenogram, in one position, may fail to visualize the lesion, which [illegible]

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There is common agreement that a good portion of patients suffering with diverticulitis will respond to nonsurgical means. Too, there is little diversity of opinion that the complications of this disease require surgical intervention. Of these may be mentioned peridiverticular abscess, perforation, fistula and obstruction. More than occasionally it is impossible to distinguish between malignancy and diverticulitis, for which reason exploration under such circumstance is justifiable.

It is recognized that the establishment of a stoma proximal or orad to the involved segment of bowel is followed by improvement of the symptomatology as a result of subsidence of the inflammatory process.

While patients with sigmoidal diverticulitis and its concomitant complications must be studied individually, no single procedure can be selected arbitrarily which will meet the requirements of every case. The exteriorization operation designed by Mikulicz and modified by Rankin will be found applicable in most cases. During the past decade there has been a definite trend toward resection with immediate establishment of continuity. While such an operation obviously serves to eliminate much of the invalidism associated with multiple stage procedures, there is seldom an instance where it can be employed without risk, unless defunctionalization has been in strate them with great clarity. The most effective routine should include anteroposterior, left oblique and right oblique views. In the prediverticular state, the roentgenogram will usually show replacement of the normal segmentation of a small portion of the sigmoid by a unilateral, ragged, irregular, sawtooth marginal outline. In the same film, all of the stages of diverticulosis may be demonstrated. Larger sacculations may be clearly visualized and assume widely divergent shapes and groupings. Some appear round, others ovoid and still others semiglobular. They may occur singly or in oddly-patterned groups. They may appear as a chain of opaque dots in a double row, connected with the lumen of the bowel by short, narrow necks. When fecal concretions are present, the barium will fill the sacs around the foreign body and produce a variety of shapes, such as crescents and fingerlike shadows. The deep indentations of the bowel haustra indicate spasm and are interpreted as evidence of the existence of a prediverticular state of irritability due to an associated inflammatory process. In the chronic obstructive type with tumor formation, a filling defect simulating carcinoma may be visualized. The differential diagnosis is often difficult and on occasion cannot be made with any degree of certainty. According to Feldman, there are few roentgen signs that may give the clue to the true nature of the condition. (1) The mucosal relief view of the colon does not show as complete destruction of the mucosa in diverticulitis as is found in carcinoma. (2) The picture in malignancy is constant while in diverticulitis the defect as well as the tumor has a tendency to change. (3) In diverticulitis the obstruction usually is incomplete and occurs as a late manifestation. (4) The defect in diverticulitis as a rule is fusiform or spindle-shaped and is longer than the short, abruptly demarcated lesion of carcinoma.

Not infrequently the rising column of the opaque enema may be seen to halt abruptly and no more of the solution can be introduced. The presence of an obstructive lesion is apparent but a differential diagnosis from the film is impossible. A roentgenogram following the oral administration of barium would probably yield invaluable information, but such is a dangerous practice because it may aggravate the existing obstruction. For this reason, an opaque meal is never utilized in the presence of an impending obstruction. In recent months, however, Wyatt has developed a technic for the oral administration of barium which he feels eliminates this danger. By adding magnesium citrate, he has been able to produce an opaque medium which will maintain its liquid state permanently. As a result, its administration orally does not result in impaction proximal to the lesion. This method has been employed by Dr. S. A. Linde in several cases with gratifying results.

Colovesical and enterocolic fistulae may be visualized by the passage of the opaque solution from the sigmoid into the adjacent loop of bowel or into the urinary bladder. The tracts are not always distinct, particularly in the enterocolic variety. In the colovesical fistula, the more common of the two, the tract is more easily visualized by cystoscopy, cystography, using indigo carmine, and sigmoidoscopy.

PROGNOSIS

The prognosis in diverticulosis is uniformly good. While most of these cases remain asymptomatic, approximately 15 per cent will suffer the transition to diverticulitis. When this occurs, the prognosis will become progressively worse in direct proportion to the severity and extent of the inflammatory process. Extensive surgery which may be required provides an additional prognostic risk.

TREATMENT

The treatment varies with the type and degree of inflammatory involvement. In diverticulosis and uncomplicated diverticulitis the management is medical, designed toward keeping the diverticula empty. A bland, nonirritating diet free of residue is advocated. All fruits containing seeds should be avoided. Rough, raw or stringy vegetables are similarly interdicted. Fish should be filleted and all bones carefully removed. If constipation becomes troublesome as a result of the diet, fruit juices may be consumed

ticularly in relation to the procedure best suited to his or her case.

SOMMAIRE

L'auteur a traité 101 cas de diverticulité sigmoïdale, de ce nombre, 32 furent soumis à un traitement chirurgical. On fit la résection dans 21 cas. Il y eut un décès qui une mortalité de 4.7%. Dans 6 cas, on employa la méthode d'extériorisation de Mikulicz, dans 3 cas, on pratique la proctosigmoïdectomie et dans 6 cas on fit une résection suivie d'anastomose bout-à-bout; dans 6 autres cas, on pratiqua une sigmoïdectomie avec colostomie permanente et occlusion extrapéritonéale du rectum. La technique d'Hartman fut instituée. La cystectomie partielle fut pratiquée dans 4 cas. Nous sommes d'avis qu'avant d'intervenir chirurgicalement, chaque malade doit être individualisé particulièrement afin de mieux choisir le procédé le mieux adapté à son cas.

RIASSUNTO

Gli AA. hanno trattato 101 casi di diverticolite del sigma. 32 casi sono stati sottoposti ad un intervento chirurgico. In 21 e' stata necessaria una resezione dell'intestino, con un caso di morte (4,7%). 6 casi sono stati sottoposti ad un'esteriorizzazione col metodo di Mikulicz. In 3 e' stata eseguita una proctosigmoidectomia addomino-perineale. In 6 una resezione seguita da un'anastomosi terminale. In altri 6 casi una sigmoidectomia, con colostomia permanente ed extraperitonealizzazione del moncone rettale, chiuso secondo il metodo di Hartmann. In 4 casi si e' resa necessaria una cistectomia parziale.

Gli AA. giungono alla conclusione che ogni paziente va esaminato accuratamente prima dell'operazione, specialmente per quanto riguarda la procedura piu' indicata ai singoli casi.

SUMARIO

Los autores han tratado 101 casos de diverticulitis del colon sigmoideo; de los cuales 32 casos fueron operados, 21 de los casos fueron tratados por la resección con una muerte, o sea 4.7% de mortalidad. De estos casos 6 fueron tratados por el método de exteriorización de Mikulicz; 3 por la proctosigmoidectomía abdomino-perineal; y 6 por la resección del segmento afectado con anastomosis de término a término. En otros 6 casos, se practicó la sigmoidectomía, con colostomía permanente y extraperitonealización del segmento rectal de acuerdo con la técnica de Hartmann. En 4 casos fue menester el practicar la cistectomía parcial. En nuestra opinión el tratamiento quirúrgico de la diverticulitis del sigmoides debe de ser individualizada, es decir que es menester el seleccionar el procedimiento quirúrgico en relación con cada caso.

true in the presence of associated abscess formation, where several unrelieved symptoms which are severe, and pertinent to the bladder exist, and as a preliminary stage to resection. In performing the colostomy, it is important to separate the two loops of bowel in order to prevent "spill-over" of the intestinal content. Cave and others recommend diversion of the fecal stream prior to removal of the involved segment with its adjacent fistula. Our usual plan is to establish a transversostomy of the Wangensteen or Devine type. Following a period of daily irrigation with sulfathalidine in suspension form through the lower (distal) loop to permit the inflammatory process to subside, resection is performed. Urethral drainage is instituted prior to resection, while suprapubic drainage is established at the time of resection. The Mikulicz procedure of exteriorization is an ideal method along with cystectomy. We are convinced that an immediate end-to-end anastomosis and cystectomy is unnecessarily formidable and therefore a poor choice.

Obstruction calls for bed rest and the parenteral administration of fluids. If small bowel distention supervenes, intestinal intubation should be instituted. In the presence of acute colic obstruction, surgical decompression is indicated. Our choice has been appendicostomy or cecostomy, while in chronic obstruction a transversostomy is preferred.

Operation. In our group of 104 patients with diverticulitis, 32 were submitted to operation.

TABLE 2. OPERATIONS EXCLUSIVE OF RESECTION.

Operation	Cases	Deaths	Mortality Per Cent
Colostomy for obstruction..	5	1	20.0
Incision and drainage of abscess	3	1	33.33
Drainage for perforation without closure	2	0	0
Exploration only	1	0	0
Total	11	2	18.1

Resection was performed in 21 instances. Proximal colostomy of the defunctionalizing type (Wangensteen or Devine) usually had been established at a suitable time prior to resection.

Six operations were performed by the exteriorization method of Mikulicz, three by abdominoperineal proctosigmoidectomy, and six by resection followed by end-to-end anastomosis. In six patients, sigmoidectomy with permanent colostomy and extraperitonealization of the closed rectal stump (Hartmann technic) was instituted. Partial cystectomy was required in four instances.

TABLE 3. RESECTION.

Type of Resection	Cases	Deaths	Mortality Per Cent
Exteriorization (Mikulicz).	6	0	0
Abdominoperineal proctosigmoidectomy	2	0	0
Abdominoperineal proctosigmoidectomy with hemicolectomy	1	0	0
Resection followed by primary end-to-end anastomosis	6	1	16.6
Anterior resection with colostomy and exteriorization of closed rectal stump with concomitant partial cystectomy in four	6	0	0
Total	21	1	4.7

SUMMARY

One hundred and four cases of sigmoidal diverticulitis were treated by the authors; of this number, 32 were submitted to surgery. Resection was performed in 21 cases with one death, a mortality rate of 4.7 per cent. Of the major surgery performed 6 were by the exteriorization method of Mikulicz; 3 by abdominoperineal proctosigmoidectomy and 6 by resection followed by end-to-end anastomosis. In 6 others, sigmoidectomy, with permanent colostomy and extraperitonealization of the closed rectal stump by the Hartmann technic was instituted. Partial cystectomy was required in 4 instances. It is our opinion that prior to surgical intervention each patient must be carefully individualized, par-

Mortality Factors in Acute Intussusception in Infants and Children*

HARRY A. OBERHELMAN, M.D., F.A.C.S., F.I.C.S., AND
JOHN B. CONDON, M.D.
CHICAGO, ILLINOIS

SINCE acute intussusception is the most common cause of intestinal obstruction in infants and children, factors governing the mortality of this condition may well be emphasized from time to time. We believe that this can best be done by contributing to the literature studies of larger series of patients with acute intussusception and by comparing such studies with similar studies made by authors from other similar institutions.

Our studies are based on an analysis of 95 patients previously reported by us[1] and on an additional 12, making a total of 107 infants and children that were admitted to the Cook County Children's Hospital during a 23-year period from 1925 to 1947 inclusive. Approximately 68 per cent of these patients were under one year of age, 21 per cent were between 1 and 2 years, 8 per cent were between 2 and 3 years and 3 per cent were 3 years or over. The youngest in our series was 2 weeks old and oldest 15 years of age. All the operations were performed by the various members of the surgical staff.

In comparing our studies with similar studies reported in the literature it is not our object to present a complete review of the literature but simply to select a limited, fairly representative number and employ them for purposes of comparison (Table 1).

Some of the more significant mortality factors in acute intussusception are considered in the following discussion.

Age Considered as a Mortality Factor. Since intussusception is primarily and peculiarly a disease of infants and children, one might question whether age should really be considered in this category. It may be stated generally that with all things being equal, infants under one year of age sustain a higher mortality rate than infants between one and two years of age regardless of the type of surgery. In our series, however, just the reverse was true. Yet when it comes to children over 3 years of age the mortality is definitely lower and consequently age does become a factor in mortality.

Types of Intussusception. In order to avoid confusion in designating the various types of intussusception, we have become quite partial to the classification suggested by Nyborg,[5] who divides them into three groups: (1) Those occurring at the boundary between the small intestine and colon (ileocecal, ileoileocecal, ileocolic, and ileoileocolic). (2) Those occurring in the ileum alone. (3) Those occurring in the colon alone. From a study of our series those occurring at the boundary between the small intestine and colon sustained the highest mortality, while those involving either the ileum alone or colon alone had a much lower mortality. Perrin and Lindsay reported similar findings. On the contrary, Hogg and Donovan and Gibbs and Sutton noted their highest mortality in the ileoileal group and their lowest rates in the group involving the boundary between the small intestine and the colon. It seems apparent, therefore, that the type of intussusception has no constant material effect upon the mortality rate.

Progression of the Intussusception. Ladd and Gross noted in their studies that the farther the intussusception advanced the higher the mortality. Similar findings were reported by Hogg and Donovan. In our studies, however, this was not fully borne out. In 87 of our patients whose intussusceptions were palpable on physical examination the highest mortality of 19.0 per cent occurred in the group in which the intussusception was palpable in the right upper quadrant. The lowest mortality of 8.3 per cent occurred in the group in which the intussusception was palpable in the right lower quadrant, while

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* From the Department of Surgery, Stritch School of Medicine of Loyola University and the Cook County Children's Hospital, Chicago.

TABLE 1. COMPARATIVE MORTALITY BY DURATION OF SYMPTOMS.

Authors	Total Cases	Duration of Symptoms in Hours							
		0 to 24		25 to 48		49 to 72		Over 72	
		Cases	Mortal. %	Cases	Mortal. %	Cases	Mortal. %	Cases	Mortal. %
Ladd and Gross [2]	484	234	8.5	118	42.3	52	42.3	80	65.0
Gibbs and Sutton [3]	86*	38	10.5	19	15.8	6	33.3	23	63.2
Musil [4]	105	44	0.0	27	26.0	34	32.0	..	....
Oberhelman and Condon [1]	107†	50	2.0	21	14.2	21	38.0	14	50.0

* Not including 6 in which history was not obtained
† Including 1 in which history was not obtained.

the mortality for the left upper quadrant, left lower quadrant and the epigastrium were 9.1 per cent, 10.0 per cent and 16.6 per cent respectively. Furthermore, in this connection it should also be noted that we found no evidence to support the notion that the longer the symptom period the more caudad the intussusception. As a matter of fact, the average symptom period of those whose intussusception was palpated in the epigastrium was 49.7 hours compared to an average of 25.1 hours for those appearing in the more caudad left lower quadrant. We are inclined to the view that a mobile cecum and ascending colon having a long mesentery play a more prominent role in the matter of distance traveled by the intussusception than that played by the duration of the symptom period.

Duration of the Symptom Period. Without doubt, the duration of the symptom period is the most significant single factor in the mortality rate of acute intussusception (Table 1). If treatment is instituted during the first 24-hour period after onset, whether reduction be accomplished by surgery or by hydrostatic measures, the mortality will be low. In our series there was but one death in 50 patients. Obviously, this represents the period before complications set in. Should the delay in instituting treatment exceed 24 hours the mortality rises promptly and progressively (Table 1). Clearly, this represents the period when serious complications are ushered into the picture. Dehydration from vomiting and lack of fluid intake, signs of intestinal obstruction, acute peritonitis and shock comprise the group of complications that increase, so materially, the risk in any type of surgical therapy.

Signs and Symptoms of Shock. In our series there were 36 patients admitted in varying degrees of shock. On close analysis, two types of shock were noted, each with an apparently different causative factor. In the first type the patient had a short symptom period whose shock syndrome could best be explained on the basis of a sudden onset, the severity of the pain and the probable traction on the root of the mesentery. There were 22 patients in this category and all made uneventful recoveries following simple manual reduction by operation. In the second type the patient had a long symptom period whose shock syndrome was explained on the basis of vomiting, dehydration, intestinal obstruc-

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* From the Department of Surgery, Stritch School of Medicine of Loyola University and the Cook County Children's Hospital, Chicago.

TABLE 3. INCIDENCE AND MORTALITY OF RECURRENCES.

Authors	Cases	Recurrences		
		Cases	Deaths	Mortal. %
Ladd and Gross	484	10*	0	0.0
Close	363	14	Not Mentioned	
Hogg and Donovan	123	4†	1	25.0
Oberhelman and Condon	107	4‡	0	0.0
Gibbs and Sutton	92	3	0	0.0
Total	1169	34	1	5.0

* One patient and 4 recurrences
† One had 3 recurrences.
‡ One had 2 recurrences.

Complications. Of the 19 patients dying in our series, three were moribund and died shortly after admission to the hospital; 5 died on the operating table, 3 having required resections; 5 died in less than 9 hours postoperatively from shock and 6 died from one to eight days after operation from peritonitis. These fatal complications, one can readily see, were the direct result of the intussusception itself, and when such complications arise, surgery is the only hope and that often ends in failure. In the 88 recovering from surgery, only 10 had surgical complications. Evisceration occurred in 3 patients, bronchopneumonia in 4, wound infection in 2 and intestinal obstruction in one.

Inadequate Preoperative, Operative and Postoperative Care. The importance of adequate preoperative, operative and postoperative care cannot be overemphasized. The higher mortality rates indicated in some of the earlier reports (Table 2) may well be attributed to the lack of some of the more recent aids to surgery such as chemotherapy, the antibiotics, plasma, blood and the continuous Wangensteen suction. The advantage of having both the pediatrician and the surgeon share the responsibility equally is immense. We feel that regardless of how urgent surgical intervention may be, it is of distinct advantage to delay any surgery long enough to permit at least some restoration of the fluid and electrolyte balance by the intravenous administration of glucose and saline solutions augmented by plasma and blood transfusions. By maintaining the administration of one or other such fluids during the operation as well as during the immediate postoperative period many patients recover who otherwise would terminate fatally in spite of the finest surgical technic. It is common knowledge, however, that since these improved facilities have been available and made use of, the overall reduction of the mortality has been most gratifying. This is clearly evidenced by the overall mortality of 5.2 per cent for the last 57 consecutive cases in our series.

Conclusions. Various factors that play a part in the mortality in acute intussusception have been discussed. The greatest single factor in this mortality is the duration of symptom period. If the symptom period exceeds 24 hours complications appear and as the symptom period increases thereafter the most effective methods of treatment become progressively less effective. The greatly improved preoperative, operative and postoperative program shared in equally by the pediatrician and surgeon has greatly aided, however, in a progressive lowering of the mortality rate. Aside from an occasional unexplained death following surgery, the mortality would be reduced to a minimum if treatment could be instituted within the first

24 hours. By educating the public to consult the physician early and by stressing early diagnosis by the physician, a "new low" in the mortality of acute intussusception may be anticipated in the near future.

SUMARIO

Se han discutido los factores contribuyentes a la mortalidad en la intususcepcion aguda. El factor singular mas importante es la duracion del periodo simtomatico. Cuando este excede mas de 24 horas, las complicaciones aparezen y contra mas dura el periodo simtomatico menos efectivo sera el tratamiento. Sin embargo, el mejoramiento del regimen preoperatorio, el procedimiento quirurgico y el tratamiento post-operatorio, con coperacion del sirujano y pediatrista ha hayudado a disminuir considerablemente la mortalidad; esta aun seria mucho mas minima se en tratamiento se instituye en las primeras 24 horas. Solo con la educacion del publico de recurrir a tiempo al medico y ensenandole al ultimo la importancia del reconocimiento de esta condicion quirurgica se podra solo asi disminuir aun mas la mortalidad que acarrea la intusucepcion aguda.

SOMMAIRE

Différents facteurs déterminant la mortalité de l'intussusception aiguë sont discutés. Le facteur le plus important dans la mortalité est la durée des sypmtômes. Si les symptômes ont duré plus de 24 heures, des complications surviennent et augmentent la mortalité. Les traitements tardifs échouent le plus souvent. Mais le programme moderne améliore grandement les résultats et contribue à abaisser la mortalité.

Des cas exceptionnels, exceptés la mortalité des cas d'intussusception traités chirurgicalement est réduite au minimum quand on intervient dans les premières 24 heures. Il faut recommander les malades de consulter leur médecin au début des douleurs. Le diagnostique précoce de l'intussusception aiguë permettra d'atteindre une nouvelle diminution dans la mortalité de cette affection.

RIASSUNTO

Dopo avere discusso l'influenza di svariate condizioni che contribuiscono alla mortalita' per intuscezione acuta dell'intestino, l'A. conclude che la percentuale di mortalita' dipende principalmente dalla durata dei sintomi. Se il periodo di attesa supera 24 ore, entrano infatti in scena delle complicazioni, che rendono poi vane le cure piu' diligenti. Educando il pubblico a consultare subito il medico, ed istruendo il medico a porre una diagnosi *precoce, e' molto probabile che la mortalita'* subira' una notevole diminuizione.

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Palliative Operations for Unresectable Carcinoma in the Pancreatoduodenal Region

JOHN W. McCALLISTER, M.D.
CHICAGO, ILLINOIS

CARCINOMA of the pancreas accounts for 3 per cent of all cancer deaths. Carcinomas of the ampulla-papillary region constitute slightly over 1 per cent of all carcinomas.[3] When it is recalled that about two-thirds of pancreatic carcinomas occur in the head of the pancreas, it becomes evident that over 2 per cent of *all* cancer will be found in this relatively small area centered in the concavity of the duodenal loop.

Since 1935, when Whipple and his associates[4] described a procedure for resection of the pancreas and duodenum, much attention has been given to the development of new procedures and modifications of the original technic for pancreatoduodenal resection.

The resectability rate of tumors in this region is reported to be from 25 to 30 per cent.[1] Review of the cases of pancreatic and ampullary carcinoma coming to surgery at the Wesley Memorial Hospital does not indicate a resection rate over 10 per cent; 75 per cent are pancreatic carcinoma, which in general tends to show earlier local extension and distant metastasis than does ampullary carcinoma. This distribution in part may account for the low resection rate. The evaluation of these tumors on the basis of their potential curability, rather than their mechanical resectability, may account for the remaining discrepancy. It is possible that the *net* gain in terms of more months of life for more patients would be increased by subjecting fewer of these poor risk patients to extensive surgical procedures in the presence of disease grossly advanced beyond the limits of curability.

Regardless of the attitude of the individual surgeon, the fact remains that at least three out of four patients with pancreatoduodenal carcinoma are going to have disease which has extended beyond the limits of resectability and curability. It seems worth-while, therefore, to discuss some of the problems encountered in the management of this larger group of patients presenting advanced lesions.

The importance of careful choice of palliative procedures is emphasized by the evidence that these patients are frequently subjected to reoperation for relief of progressive involvement not anticipated at the initial operation. One patient in every three has more than one palliative surgical procedure. Repeated hospital admissions are the rule rather than the exception for these patients. Those in the group under consideration averaged two hospital admissions each, though only one-fourth of them died in the hospital.

ANATOMIC FACTORS INFLUENCING OPERABILITY

The anatomic position of the head of the pancreas allows but little extension of malignant tumors before invasion of adjacent structures renders the lesions inoperable.

If the curvature of the pancreas and duodenum in the frontal plane is ignored, the tissue block composed of the first three portions of the duodenum and the pancreatic head may be considered as a retroperitoneal rectangular solid presenting six surfaces.

The anterior surface is traversed by the base of the transverse mesocolon. Extension between its layers tends to shorten the mesocolon and frequently involves the colic vessels.

The hepatoduodenal ligament and components of the hepatic trinity are involved by upward extension.

Posteriorly, invasion of the mesenteric vessels, portal vein, inferior vena cava, lumbar vertebral bodies, or aorta occurs and renders these neoplasms not only unresectable, but often dangerous to manipulate.

Inferiorly, involvement of the superior mesenteric vessels is the most frequent extension precluding resection.

Lateral extension to the right or left is least liable to produce early inoperability, as involvement of the second portion of the duodenum or the body of the pancreas will not greatly alter the resection to be done.

DETERMINATION OF UNRESECTABILITY AT TIME OF OPERATION

Unresectability is determined by findings which fall into two groups: those which are evident on gross inspection, and those determined only by dissection to expose areas of extension not visible on first inspection.

Gross indications for palliative procedures only are:

1. Widespread peritoneal metastases.
2. Hepatic metastases.
3. Obvious extension of the lesion beyond limits of resection.
4. Immobility of the lesion, indicating posterior fixation.

Steps in dissection to reveal unresectability:

1. Kocher's maneuver to mobilize the duodenum and head of the pancreas. This will reveal posterior fixation not previously evident.
2. Division of gastrohepatic and gastrocolic omentum permits inspection of the superior mesenteric vessels and the portal vein. Involvement of any portion of these vessels precludes the possibility of resection.

CHOICE OF PALLIATIVE PROCEDURES

Once the hope of resection is abandoned, one must choose palliative procedures which will relieve the patient's present and potential symptoms with the least risk of operative mortality. Palliative measures should be simple and involve a minimal number of anastomoses, as the very extent of their disease makes these patients poor surgical risks.

The most frequent problem encountered is that of short-circuiting the biliary tract to relieve jaundice and its associated phenomena. Seventy per cent of the inoperable cases had jaundice as a presenting symptom.

Cholecystgastrostomy need be mentioned only to be dismissed as an unphysiologic procedure. Bile will not flow from the biliary tree into a viscus (in this case the antral portion of the stomach) in which the pressures normally obtaining are *higher* than pressure in the bile passages.

Cholecystduodenostomy at the first, or junction of the first and second portions of the duodenum, is the simplest procedure available. The operation may be open to some criticism as a permanent short-circuiting method in nonmalignant conditions, but it has proved entirely adequate for the rather short expectancy (five to 16 months) in these cases. It is not indicated where there is actual or impending obstruction of the duodenum.

Cholecystjejunostomy is the next procedure of choice. Enteroenterostomy between the afferent and efferent limbs of the jejunum may or may not be necessary. This has been employed one-third as often as cholecystduodenostomy in the Wesley Memorial Hospital series, and has given comparable results.

Obstruction of the duodenum is a surprisingly frequent complication (15 per cent) in carcinoma of the pancreatoduodenal region, and is responsible for 28 per cent of second palliative operations. It is worth-while to note that obstruction tends to occur at the angles between the portions of the duodenum. Gastroenterostomy should be considered at the time of initial operation if there is a history of nausea, epigastric distress, upper abdominal distention, and vomiting. Succussion sounds are easily elicited in malignant duodenal obstruction. Roentgen examination fails to show early changes in the duodenal lumen, but the angles between the portions of the duodenum should be observed with particular care. The onset of obstruction is insidious and distressing. The patients seem to tolerate their nausea and sensation of fulness well for periods up to 24 hours, only to regurgitate 2 to 3 liters of retained food and gastric secretions. Posterior gastroenterostomy is indicated unless there is invasion of the mesocolon with shortening and thickening. If done in conjunction with cholecystjejunostomy, an antecolic anastomosis is employed.

Obstruction of the pancreatic duct is of least importance in producing the patient's symptoms. The endocrine function of the pancreas is not disturbed, and oral administration of pancreatic extract appears effective in relieving residual gastrointestinal complaints. In the event that the pancreatic duct is dilated and palpable, employment of the T-tube pancreatojejunostomy as advocated by Cattell[2] appears feasible, although we have not observed its use.

SUMMARY

1. In the midst of current interest in extensive resections of the pancreas and duodenum for malignancy, it is well to recall that the majority of patients with pancreatoduodenal carcinoma will be candidates for palliation only.
2. Incidence of reoperation and rehospitalization of these patients with inoperable carcinoma indicates that initial palliative operations are often inadequate.
3. The anatomic limitation and clinical determination of resectability are described briefly.
4. Palliative surgical steps are outlined. Attention is directed to the relative frequency of duodenal obstruction as a distressing complication and indication for reoperation.

SOMMAIRE

Dans la résection étendue du pancréas et du duodénum pour maladies malignes, il est important de se rappeler que la majorité des malades souffrant de carcinome pancréatique sont des candidats seulement pour soulagement. La fréquence de réoperation et réhospitalisation de ces malades avec carcinome indiquent que les opérations initiales palliatives sont souvent inadéquates. La limitation anatomique et les déterminations cliniques de la résectabilité sont brièvement décrites. Les procédés chirurgicaux palliatifs sont énumérés. L'obstruction duodènale assez fréquente c'est une complication malheureuse et aussi une indication pour réoperation.

RIASSUNTO

Il crescente interesse riguardo piu' ampie resezioni per carcinomi del pancreas e del digiuno e' menomato dalla constatazione che la maggioranza dei pazienti affetti da cancri pancreatico-duodenali sono candidati solo ad un trattamento palliativo. La frequenza di riospedalizzazione e di rioperazione dimostrano d'altra parte che anche l'intervento iniziale, eseguito a solo scopo palliativo, non corrisponde poi all'aspettativa. L'A. discute percio' le limitazioni a carattere anatomico e le condizioni cliniche che influiscono sopra la possibilita' di una resezione di questi tumori: indica inoltre la migliore procedura chirurgica per alleviare almeno le condizioni dei pazienti. Richiama infine l'attenzione sopra la relativa frequenza di un'ostruzione duodenale quale complicazione grave e ribelle, mentre sottolinea le indicazioni per una seconda operazione.

SUMARIO

No obstante el gran interes que hay hoy en dia de practicar resecciones extensivas del pancreas y del duodeno en el tratamiento del cancer se debe de recordarse que la mayoria de los casos de cancer pancreatico-duodenal son candidatos a un tratamiento que es solamente paliativo. La insidencia de la reoperacion y rehospitalizacion de pacientes con canceres inoperables es un indicio que las operaciones paliativas previas fueron frecuentemente insuficientes. Las limitaciones anatomicas y la determinacion clinica de la resectabilidad del cancer de esta region han sido descritas en este papel. Se llama la atencion a la frecuencia relativa de la obstruccion duodenal como complicacion quirurgica y como indicacion para la reoperacion del paciente.

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Vagotomy for Chronic, Nonspecific, Ulcerative Colitis*

PHILIP THOREK, M.D., F.A.C.S., F.I.C.S.
CHICAGO, ILLINOIS

IN 1946, while discussing vagotomy and peptic ulcer with Dr. A. A. Berg of New York, the idea was projected that this procedure might be a feasible therapeutic measure for chronic, nonspecific ulcerative colitis. From this time on a suitable case was sought. At the present writing I wish to present the results obtained in 8 cases of proved chronic, nonspecific ulcerative colitis upon which vagotomies were performed.

It is a well-known fact that in chronic, nonspecific ulcerative colitis conservative treatment has not been gratifying. Routine surgical management necessitates either radical colectomy or ileostomy; these procedures are beset with disastrous complications at times. Furthermore, if any procedure can improve the condition and prevent the necessity of going through life with an ileostomy, such a procedure is justified.

In 1941, Lium[1] reported his results in the removal of prevertebral ganglia in dogs. These animals developed diarrhea and lesions suggesting clinical colitis in man. The results of postganglionic sympathectomy, therefore, might give us a clue to the rationale of vagotomy in this disease.

Dennis and Eddy,[2] in 1947, reported on the evaluation of vagotomy in chronic, nonspecific ulcerative colitis. They concluded that their preliminary investigations indicate that vagotomy offers some promise in these cases. In a recent personal communication[3] with one of these authors (F.D.E.), he stated that in his opinion the greater majority of these cases have shown improvement.

To date I have performed bilateral subdiaphragmatic vagotomy on 8 proved cases of chronic, nonspecific ulcerative colitis. Our first case is reported in some detail.

Case 1. Mrs. F. W., a white female, 56 years of age, entered the hospital with a typical history of chronic, nonspecific ulcerative colitis of seven years duration. She stated that her colitis began when her two sons entered the armed service. The condition became increasingly severe until 1943, when it reached its peak. It had continued as a fulminating condition for the past four and one-half years.

Repeated stool examinations revealed mucus and blood. All examinations for bacilli and amebae were negative. The x-ray examination was typical of ulcerative colitis, revealing a rigid pipe stem colon. Bowel movements occurred so frequently during the day that she practically had to "live on a bed pan." This frequency of defecation continued throughout the night, the stools benig very loose and watery.

Physical examination was essentially normal, with the exception of a far advanced crippling and deforming arthritis.

On November 17, 1947, a transabdominal bilateral vagus nerve section was performed. Within a few days following surgery the number of stools decreased and the blood began to disappear, and at present no trace of blood can be found. The consistency of the stool had changed from a liquid watery stool to a semisolid or well-formed one. She is now able to sleep through the night without being disturbed by a continuous tenesmus and desire to defecate. She has gained weight, feels much stronger and her entire personality has changed for the better. At the present writing, which is approximately a year following surgery, her continued improvement is most encouraging.

Case 5. The most dramatic result was achieved in this case. This was a 32-year-old, white female, with a history of a chronic, nonspecific ulcerative colitis of three years duration. Her treatment consisted of excellent medical care including a two-year regime on chemotherapeutic measures. The patient continued to lose ground and finally an ileostomy was performed. Her condition improved slightly following this, but she was still too ill to leave the clinic at which she was operated upon. She was flown to Chicago in an almost moribund condition with a recurrence of all of her earlier symptoms. The x-ray report which was sent by her previous surgeon stated that not only was her entire colon involved but also the entire small bowel from the ligament of Treitz to the ileocecal valve. Bilateral vagotomy was performed on this patient in July, 1948. At present she is up and about, enjoying a highly nutritious diet and is gaining weight.

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* From the Departments of Surgery, University of Illinois, Cook County Graduate School of Medicine, Cook County Hospital and American Hospital.

Case 4. A not so gratifying result occurred in this case. This patient is a 28-year-old white female, who presented the following history: In 1941 she developed a diarrhea associated with mucus and blood in the stool. After careful examination by competent gastroenterologists, a diagnosis of chronic, nonspecific ulcerative colitis was made. Many forms of conservative therapy were attempted, but none of these helped and her condition became progressively and rapidly worse. Ileostomy was advised and performed in 1944 (3 years after the onset of symptoms). There was only temporary and mild relief. Despite the well-functioning ileostomy, she retained a normal desire to defecate, and with each defecation stated that only mucus and blood continued to pass, sometimes more and sometimes less. Physical examination revealed an extremely thin and emaciated female who entered the hospital with unbearable rectal pain. It was impossible to make a rectal examination because of the severe anal spasm. Opiates were required for relief. Following vagotomy the relief of rectal pain was immediate and striking. Rectal examination could now be accomplished without anesthesia. The constant desire to defecate was gone, and the number of stools was reduced from 20 to 30 liquid stools a day to two or three solid stools. The patient was greatly improved mentally as well as physically. The mucus and blood disappeared within a week after surgery. Her improvement was dramatic for a period of three months, and then following an emotional storm which resulted from a divorce court proceeding, her symptoms recurred. Her insulin tests were inconclusive as to the completeness of the vagotomy. In the hope of doing a more complete vagus nerve section, this patient is at present being prepared for a transthoracic vagotomy.

The remaining five cases are typical examples of mild to far advanced chronic, nonspecific ulcerative colitis, all presenting mucus, pus, blood and diarrhea. All of these have responded most favorably to vagotomy.

Observations upon these cases included the presence of blood, pus and mucus in the stools, proctoscopic and barium enema studies, insulin gastric analyses, and electrocardiographic findings. Some studies at present are being conducted on transit time of material through the intestines

ANATOMY

Unfortunately, there are marked contradictions in the leading textbooks on anatomy regarding the vagi. This is probably due to the fact that erroneous information was obtained from works by Hirschfeld and Leveillé[4] and Kollmann[5] in the middle of the nineteenth century, and many of the modern textbooks have obtained their information from these sources.

Probably the most reliable information comes from E. Perman[6] who, in 1935, performed a series of painstaking and accurate dissections dealing with this subject. His conclusions are interesting, instructive and apparently accurate. He concluded that both vagi reach the stomach through the lesser omentum and that they divide into branches without the formation of a plexus of intertwining fibers. He stated that anastomoses exist between the various branches but that they do not lose their individuality as would be the case in a nerve plexus. The left vagus nerve sends branches to the liver and to the *anterior wall of the stomach.* Those traveling to the liver turn to the right, pass through the lesser omentum and to the porta hepatis. The gastric branches divide into several smaller nerves, which spread over the anterior wall and can be followed to the greater curvature. The right vagus nerve is arranged [illegible] a similar manner; one part to the [illegible] plexus, and the remainder supply the [illegible]terior wall of the stomach. Perman w[illegible] able to follow branches of either the [illegible] right vagus into the greater omentum

Recently papers have appeared [illegible] with the subject of the nerve sup[illegible] stomach, but they are quite [illegible] Bradley, Small, Wilson and [illegible] amined 111 cadavers and [illegible] was a great variation in [illegible] the cardi[illegible] [illegible] but that [illegible] course and distribution [illegible] stomach. They divided [illegible] into four groups. [illegible] the vagus nerve [illegible] [illegible]

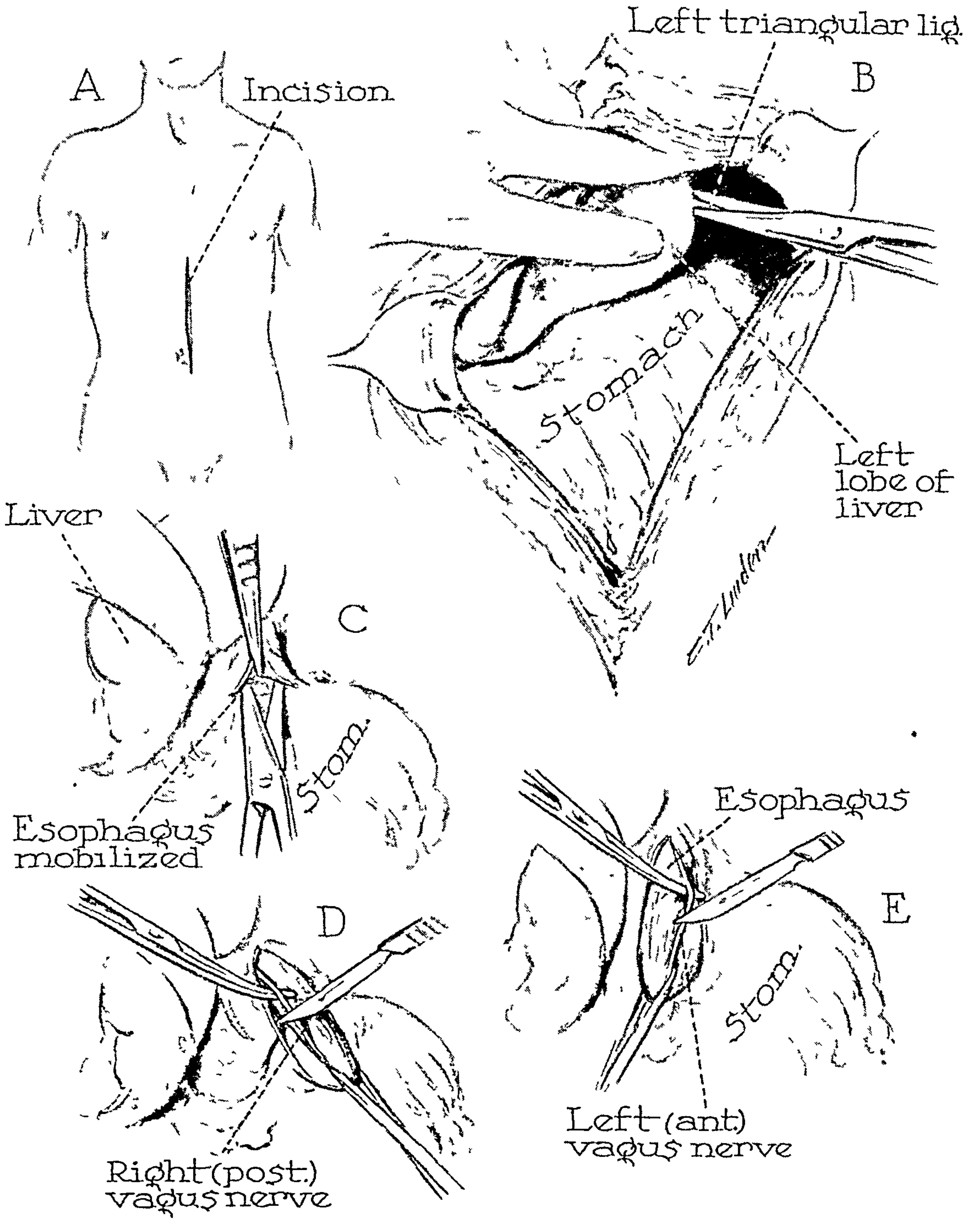

Fig. 1. Transabdominal bilateral vagus nerve section. A Long left upper rectus incision. B. Left triangular ligament is incised, permitting retraction of the left lobe of the liver to the right. C Posterior parietal peritoneum is incised over the esophagus, thus making mobilization of the esophagus possible. D Right (posterior) vagus nerve is identified and severed. E. Left (anterior) vagus nerve is identified and severed.

in the textbooks as "normal," and that the remaining 10 showed marked variations. With this present state of confusion regarding the anatomy one can only conclude that the various vagal patterns must be understood by the surgeon, and complete dissection employed in order that all fibers may be severed.[9]

SURGICAL TECHNIC

Although some might argue that it is inadvisable to traumatize an already inflamed intestinal tract, I feel that the lesions should be seen in an attempt to eliminate possible associated malignant tendencies. Furthermore, since these patients are so critically ill they seem to withstand a transabdominal procedure better than a transthoracic one. At times transthoracic vagotomy may become necessary as was stated above in Case 4.

Transabdominal vagotomy is performed through a long left rectus incision which commences in the angle between the xiphoid and the left costal arch and extends 1 or 2 inches below the umbilicus (Fig. 1). The peritoneal cavity is entered and the left triangular ligament of the liver is exposed and made taut. This bloodless fold is incised, and it then becomes possible to retract the left lobe of the liver to the right. The peritoneum covering the lower end of the esophagus is incised and a finger or scissors is placed into the posterior mediastinum to mobilize the esophagus so that its lower 3 or 4 inches can be delivered into the abdomen. The nerves are identified, ligated and severed, and at times it is possible to isolate and ligate both vagi on the left side. I have observed that the left (anterior) vagus has a tendency to hug the esophagus and that the right (posterior) travels a slight distance away from it; therefore, it is easier to feel and identify the latter. At the conclusion of the operation, the left lobe of the liver is permitted to fall into place; it has been found unnecessary to resuture the severed left triangular ligament.

Postvagotomy atony is believed to be due to a transient increased pyloric tonus; swallowed air and saliva may aggravate the condition so that an acute gastric dilatation results. To prevent this, constant Wangensteen suction is instituted for three to five days postoperatively. This is continued until all tendency toward nausea or vomiting is relieved. Certain medicaments, especially those of the choline group, show some promise in the treatment of gastric atony; time will prove their efficiency. Foul smelling belching and emesis may result; I have not noticed these complaints.

SUMMARY

Eight cases of chronic, nonspecific ulcerative colitis are reported in which bilateral subdiaphragmatic vagotomy has been performed. This procedure shows some promise as a therapeutic measure but no definite conclusions can be drawn at this time. Since the cases previously operated have not suffered any ill effects, and since most of them have actually improved, I feel that the procedure warrants further investigation.

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Solitary Nonparasitic Cyst of the Liver[*]

RAYMOND F. HEDIN, M.D., F.A.C.S.
RED WING, MINNESOTA

SOLITARY nonparasitic cyst of the liver is a rather rare condition. In 1944 Eliason and Smith[10] reported that at the Philadelphia General Hospital only 28 cases of solitary nonparasitic cysts of the liver were found in 20,000 consecutive autopsies. Davis,[9] in 1937, reviewed the literature and found 499 cases of liver cysts, of which 187 were solitary unilocular cysts and 20 were solitary multilocular cysts. In a 24-year period at Montreal General Hospital[1] there were 10 cases of solitary nonparasitic cysts of the liver in 6141 consecutive autopsies. Cystic changes in the liver have been discovered for the most part at autopsy. Moschcowitz,[19] in 1906, in a review of 85 cases, found 10 cases in which the liver alone was involved, the remainder being associated with cystic disease of the kidney, pancreas, etc.[28]

The relationship of solitary and multiple cysts of the liver is not well understood, and it is thought by many observers that solitary cysts are often the end result of many small cysts coalescing into one solitary cyst of the liver. There is no unanimity of opinion[7, 15, 21] as to the origin of liver cysts. Moschcowitz, after an extensive study, suggested that many originated in aberrant bile ducts, which he was able to demonstrate both in the acini and Glisson's capsule. He believed these aberrant ducts to be embryonic "rests" formed in the development of the liver and the cysts which resulted to be of the retention type.

Davis, Sonntag,[24] Moolten,[18] and Jones[12] have attempted to classify cysts of the liver. According to the following classification used by Ackman and Rhea[1] the condition in most instances is considered to be congenital in origin (see accompanying Table).

This view is strengthened by the fact that nonparasitic cystic conditions of the liver are frequently associated with cystic changes of the kidneys, ovaries, and pancreas. Also, other unrelated anomalies[23] such as polydactylism or meningocele often accompany this condition.

INCIDENCE

Age. All ages are represented in reported cases of solitary nonparasitic cysts of the liver. Witzel[32] in 1880 reported a case in which a large cyst complicated the delivery of a newborn infant. Moschcowitz, in a study of 85 cases, found liver cysts twice in a fetus, 7 times in the newborn, and 4 times in the first year of life. Moolten,[18] Munroe,[20] Stoesser and Wangensteen[25] have reported such cases in very young children. Montgomery[17] states that in 100 cases which he reviewed, this condition was present 25 times in children[29] under 13 years of age. Bland-Sutton[4] reported a case of a large cyst in a woman 75 years of age. The most common age at which this condition is found, however, is in the third and fourth decades of life. Multiple cysts are said to be more common in children.

Congenital	*Acquired*
1. Teratoma	1. Degenerated cysts
2. Lymphatic cysts	2. Cystadenomata
3. Blood vessel cysts	3. Bile duct cysts associated with acquired cirrhosis of the liver
4. Ciliated epithelial cysts	
5. Cystic degeneration of liver and kidney	
6. Bile duct retention cysts	

Race. McCaughan and Rassieur,[14] in their study, found nonparasitic cysts of the liver to be reported in 70 white patients compared to 3 colored patients.

Sex. Females have outnumbered males in the order of 3 or 4 to 1 in reported cases.[22, 27]

SIZE

McCaughan and Rassieur, in an analysis of 80 cases of nonparasitic cysts of the liver, found the fluid content to vary from 110 cc. to an enormous cyst containing 10,000 cc. of fluid. Ochsner[22] reported a case in which a cyst contained 4 gallons of fluid. Others[3, 13] have reported extremely large livers which contained multiple cysts weighing up to 26 pounds.

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[*] From the Interstate Clinic, Red Wing, Minnesota.

The walls of the cysts vary with the size of the cyst[8] and the length of time which the cysts have been present. In hydatid cysts there is a laminated outer capsule and an inner membrane which carries the daughter cysts. The cysts are under considerable tension. These cysts[26] are to be differentiated from nonparasitic cysts in that there is less tension and the walls are thinner. In the solitary nonparasitic type[8, 11] the wall of the cyst is composed of three layers; an inner layer, rich in cellular elements, ranging from low cuboidal to high columnar cells; the middle layer composed of circular fibers, poor in cell nuclei, and containing few blood vessels; the outer layer, composed of elastic fibers rich in cells, many blood vessels and bile ducts.

SITE

Solitary nonparasitic cysts may be found on any surface of the liver and well embedded in the liver substance. They also may be pedunculated and give rise to symptoms resulting from torsion. The anterior inferior surface of the liver is the most common location, and the right lobe[10] is involved more often than the left lobe. Eliason and Smith in 39 cases found the right lobe to be involved in 25 cases. McCaughan and Rassieur, in reviewing 80 cases, found the right lobe of the liver to contain the cysts in 52 cases.

These observers in their series found the fluid in the cyst to vary in color as follows: clear in 12, chocolate in 11, green in 16, straw in 15. The fluid may contain albumin, mucin, cholesterol, blood, hematoidin, hemosiderin, tyrocine, and granular debris. Rarely they contain bile.

SYMPTOMS

As was stated previously, most cases of nonparasitic cysts were diagnosed at autopsy. A preoperative diagnosis is seldom made. These cysts give rise to few symptoms[2] until they get large enough to cause pressure on adjacent organs. Pressure on the duodenum may give rise to obstructive symptoms In most instances the chief complaints are a feeling of weight in the abdomen and the palpation of a mass in the abdomen by the patient. Jaundice is not present unless the extrabiliary ducts are impinged upon by the adjacent cyst. The complications of solitary nonparasitic cysts of the liver are (a) torsion of a pedunculated cyst, (b) hemorrhage into the cyst,[6] (c) inflammation of the cyst, and (d) perforation of the cyst with resulting peritonitis. Pressure on the portal vein and inferior vena cava may give rise to ascites and edema of the legs.

DIFFERENTIAL DIAGNOSIS

Hydatid disease, hydrops of the gallbladder, pancreatic cyst, and pancreatic tumors are to be differentiated from solitary nonparasitic cyst of the liver. Roentgenograms[5] of the gastrointestinal tract, gallbladder and diaphragm may be helpful. Urograms showing polycystic disease of the kidney may be suggestive that the mass in the abdomen is an accompanying cystic condition of the liver.

Malignancy. Willis[31] reported the only case which resulted eventually in malignancy. This arose from the epithelial lining and metastasized to the liver, lymph nodes, and lungs.

TREATMENT

Extirpation of the cyst is the procedure of choice. This may be a simple procedure in which a clear line of cleavage is followed between the cyst and the liver substance. At times the liver may be so involved that it may be necessary to resort to a resection of a lobe of the liver[7] to remove the cyst. When it is inadvisable to attempt the removal of the cyst, marsupialization[16] may be carried out with the least danger to the patient.

PROGNOSIS

Unless pressure symptoms are produced, these patients may harbor this type of a cyst for many years. When surgery is attempted, the mortality rate ranges from 12 to 25 per cent. Davis[8] reported that surgery was done 226 times in a series of 499 cases with a mortality rate of 22.12 per cent.

CASE REPORT

Mrs. M. L., a white female housewife, age 57, was first seen at the Interstate Clinic on Jan. 12, 1948. Her family history was noncontributory to her present history.

Her chief complaints were distress and a feeling of fulness in the epigastrium. At times the distress would be present to a greater degree in the left upper quadrant of the abdomen and would be worse following the ingestion of food. She stated that for the past two years she had had attacks of pain in the right upper quadrant which would radiate to her right scapular region. These attacks were often initiated by eating fatty foods. She stated she had increasing difficulty digesting fatty foods, and that belching had been more frequent during the past two years. In the three months period prior to being seen at the clinic the patient had experienced four rather severe attacks which had been accompanied by nausea and vomiting. She had been seen by her family physician, who had made a diagnosis of possible gallbladder disease and advised the patient to have this confirmed by x-ray studies. At no time had she had any change in bowel habits, and her bowel movements had been normal in appearance. She stated that she had had four pregnancies, the last 17 years ago. She stated that she thought she "had been torn during her last delivery." During the past three years she had been conscious of the fact that her "womb had been coming out." This had at times caused her to have attacks of frequency and nocturia, and she stated that she "often dribbled urine after coughing."

On physical examination it was found that the patient was a well developed, well nourished female weighing 168 pounds. She wore glasses, and subsequently it was found by examining her eye grounds that she had a moderate degree of arteriosclerosis. The nose and throat were not abnormal.

On examining her neck, it was found she had an adenoma in the right lobe of her thyroid gland that was soft, movable, and not tender. Her chest was symmetrical, and her breasts and nipples were normal. Her lungs were normal to percussion and auscultation. Examination of her heart showed her pulse rate to be 84 per minute and regular. Blood pressure was systolic 180 mm. Hg, her diastolic 110. By percussion the heart was slightly enlarged to the left side. Her abdomen was slightly obese and contained no scars. On palpating her abdomen, a soft mass was palpated below the xiphoid cartilage extending slightly to the left under the costal margin. This was interpreted as being a low, slightly enlarged liver. There was tenderness over the region of the gallbladder on moderately deep palpation. There were no hernias present. Vaginal examination disclosed a third degree procidentia with an accompanying cystocele and rectocele. Rectal examination was normal. Both lower extremities had a few varicosities but no evidence of edema.

X-ray examination of her gastrointestinal tract was negative, and the stomach emptied normally. Cholecystogram disclosed a nonfunctioning gallbladder with "calcified shadows in the right upper quadrant quite typical of calcified gallstones." Intravenous pyelograms showed a slight hydronephrosis and hydroureter on the right side. This was followed by a retrograde pyelogram which disclosed no stone in the urinary tract, and it was thought the slight obstruction to the right urinary tract was due to the displacement of the bladder by the third degree procidentia.

The chest x-ray showed the lungs to be normal and the heart to be left ventricular in shape and probably slightly enlarged. Electrocardiographic findings showed some myocardial damage.

Urine examination was entirely normal. Blood examination showed her hemoglobin to be 12.8 Gm., red cells 4,440,000, white cells 9,800. The differential count showed neutrophils 53 per cent and lymphocytes 47 per cent. The blood serology was negative.

On Jan. 21, 1948, operation was performed through a right upper rectus incision. The abdomen was explored. The liver seemed to be slightly enlarged on the left side, and on gliding the hand over the liver, it was smooth. The gallbladder was thickened and contained many moderately large and small stones. The common duct was not distended. The remainder of the organs of the peritoneal cavity were normal. A Balfour self-retaining retractor was inserted, and it was not until then that a fairly large cyst was discovered in the left lobe of the liver. The gallbladder was removed in the usual manner, and the liver bed was peritonealized. The cyst was then removed from the left lobe of the liver by sharp dissection (Fig. 1). Very little bleeding was encountered, and the falciform ligament and accompanying fat were used to cover the remaining denuded surface of the liver. The appendix was removed. The abdomen was closed in layers without drainage. Her recovery was uneventful, and she was discharged on the ninth postoperative day.

She returned to the hospital in April, 1948, and my colleague, Dr. G. F. Hartnagel, performed a vaginal hysterectomy with repair of the cystocele and rectocele. Since then she has remained well

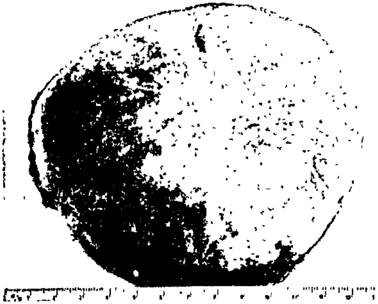

Fig. 1. Solitary nonparasitic cyst removed from the left lobe of the liver.

with improvements in the findings in the urinary tract.

Pathologic Report by Dr. John Noble. The specimen consists of a cyst of the liver, measuring 18 cm. by 12 cm. by 14 cm. It has a rather thin wall, and on one side there is evidence of liver tissue adherent to the cyst wall. The fluid contents are colorless and slightly cloudy. Microscopically the cyst wall (Fig. 2) is composed of an inner layer of cells having well stained nuclei. The middle layer contains circular fibers with several blood vessels present. The outer layer is composed of elastic fibers, rich in blood vessels, with some accompanying liver tissue visible.

Pathologic Diagnosis. Solitary nonparasitic cyst of the liver.

SUMMARY AND CONCLUSIONS

1. Solitary nonparasitic cysts of the liver are uncommon, and the preoperative diagnosis is seldom made.
2. All age groups have been reported as having this condition, and females are affected more often than males.
3. Extirpation or marsupialization of the cyst have been the surgical procedures most frequently employed.
4. The recent literature has been reviewed.
5. A case is reported in which a nonparasitic cyst was successfully removed.

SOMMAIRE

Les kystes solitaires nonparasitiques du foie sont rares et il est rare que le diagnostique soit fait préopérativement. Cette affection se rencontre à tous les âges et plus fréquemment chez la femme que chez l'homme. L'extirpation ou marsupialisation du kyste est le procédé chirurgical le plus fréquemment employé. L'auteur passe en revue la littérature récente du sujet. Il rapporte un cas dans lequel un kyste nonparasitique fut extirpé avec succès.

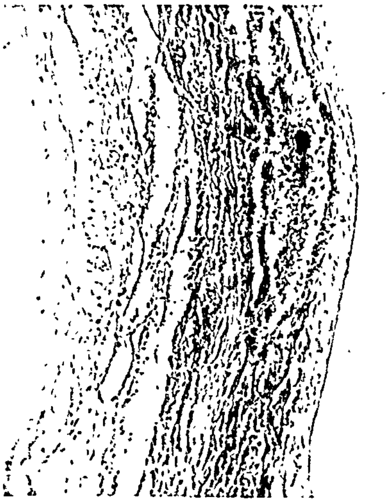

Fig. 2. Microscopic view of cyst wall. ×70.

SUMARIO

Los quistes solitarios del higado que no son the origen parasiticos son relativamente raros y su diagnostico preoperatorio es tambien raro. *Ocurren en todas las edades y son mas* frecuentes en la mujer. La extirpacion o marsupializacion del quiste es el procedimiento quirurgico mas empleado. Se ha hecho una revista de la literatura mas reciente y un caso ha sido reportado en el cual el quiste fue extirpado con resultados excelentes.

RIASSUNTO

Descrive un caso di cisti non parassitaria del fegato, estirpata con [illegible] genere sono poco comuni. Rare [illegible]

diagnosi puo' essere avanzata prima dell' operazione. Cisti solitarie del fegato occorrono in qualsiasi eta': le donne offrono una maggiore incidenza. L'A. passa in rivista la letteratura sopra l'argomento. La procedura chirurgica piu' comune consiste nell' estirpazione o nella marsupializzazione della cisti.

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The Cystic Duct: Its Role in Health, Disease and in the Complications and Sequelae of Gallbladder Surgery[*]

MANUEL E. LICHTENSTEIN, M.D., F.A.C.S., F.I.C.S.
CHICAGO, ILLINOIS

THE cystic duct is the channel through which bile passes into and out from the gallbladder. It is the narrowest portion of the extrahepatic biliary system and varies in length, diameter, shape, internal architecture and in its relations to surrounding structures. In 100 normal specimens 20 were found to be less than 2 cm. long, 55 were between 2 cm. and 4 cm. long and 25 were more than 4 cm long The circumference varies between 4 mm. and 10 mm. with an average of 6 mm. In form it may be spiral, kinked, constricted, tortuous; some appear to be knotted. The internal surface in many instances is divided into two distinct portions: a proximal portion with projections from its surface—the "valves" of Heister[1]—and a distal portion, which is smooth and free from these projections. The former is known as the "pars convoluta"; the latter, as the "pars glabra." When the cystic duct is fully distended the caliber of the pars glabra is greater than that of the pars convoluta. The "valves" of Heister are folds in the wall of the cystic duct similar to the pleats of an accordion. They represent duplications of the wall projecting into the lumen and effect a convoluted appearance on the external surface.[2] This convoluted appearance of a duct which is smaller in caliber than that of the other extrahepatic ducts is characteristic and serves to identify the cystic duct specifically. Its origin from the gallbladder and confluence with the common hepatic duct to form the common duct (ductus choledochus) also helps to identify it. The junction of the cystic duct with the hepatic duct varies considerably. Many join at an acute angle; some run parallel for a considerable distance; while others may form a spiral anterior or posterior to the common hepatic duct before effecting a continuity of their lumens.[3] At the junction of the cystic duct and the common hepatic duct a leaflike fold is present on the internal aspect. This projects toward the distal portion of the common duct and acts like a wing dam deflecting the flow of bile from the cystic duct. When obstruction in the common duct follows contraction of the sphincter of Oddi, increase in tone of the duodenal musculature, lodgment of a stone or the development of a tumor, bile passes into the cystic duct and enters the gallbladder. Thus, anatomically, the filling of the gallbladder is dependent on an increase in pressure in the common duct due to the closure of the outlet of the latter. When there is no obstruction to the passage of bile from the liver to duodenum the gallbladder does not fill.

In the intact gallbladder there may be an obstacle to the flow of fluids into or out from the gallbladder between the body and the neck and between the neck and the cystic duct. While no definite sphincter has been demonstrated, one must admit the possibility that a sphincter may exist without an organized muscle band that can be demonstrated anatomically.[4] The cardiac sphincter of the stomach is an illustration of such a possibility. In examining the gallbladder, however, one finds that the two locations where sphincters have been suggested are anatomic sites of bends in the continuity of the gallbladder. These bends in some instances represent a change in direction amounting to 180 degrees. Disturbances here have been termed intervesiculocystic dyskinesia.[5] This is an anatomic disturbance, mechanical in origin, in contrast to the spastic disturbances usually described.

The cystic duct is subjected to varying pressures up to 25 cm. of bile pressure from the gallbladder and up to 80 cm. of bile pressure from the common duct. The gallbladder pressure is acquired directly from the contraction of its musculature and possibly to some extent [illegible] the pres[illegible] of adjacent viscera or is transmitted from the thorax. In the common duct, the pressure is determined by the action of the sphincter of Oddi and the tone of the duodenal musculature. The cystic duct is devoid of any organized system of musculature, which by itself could by contraction produce changes in the internal pressure in the cystic duct.[6] The presence on the cystic duct of numerous nerve ganglia makes this a sensitive portion of the extrahepatic biliary system. It is possible, therefore, that the purpose of the "valves" of Heister is to retard distention of the cystic duct during the changes in pressure. Also, they may maintain the patency of the lumen. In those instances where the distal portion of the cystic duct is devoid of "valves" (pars glabra), dilatation does occur. This would indicate that the "valves" of Heister constitute an architectural device to maintain the size of the duct in the presence of changing pressures both in the gallbladder and in the common duct.[7] The "valves" of Heister, when normal, constitute an anatomic factor of safety.[8]

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[*] From the Division of Surgery, Northwestern University Medical School and the Cook County Graduate School of Medicine, Chicago, Illinois

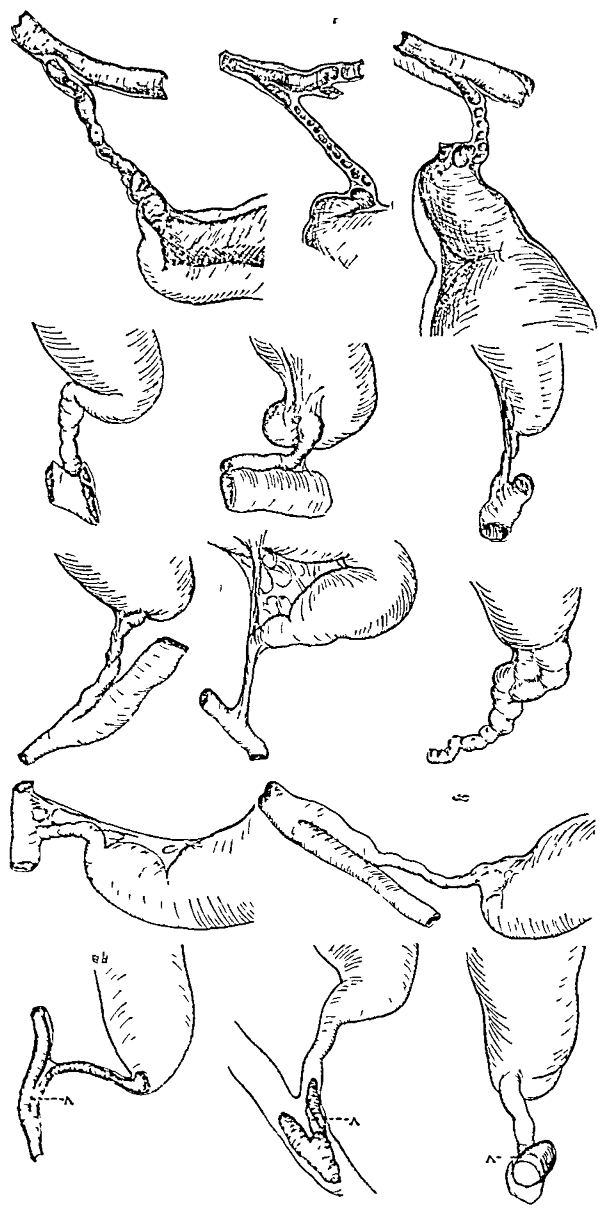

Fig. 1. Variations in the form of the cystic duct.

PATHOLOGIC CHANGES

The narrowness of the channel which connects the gallbladder to the common duct predisposes it to obstruction.[9] Edema of the entire wall or of the mucosa alone, even though slight, may be sufficient to produce interference with the filling or the emptying of the gallbladder. The duration of this obstruction will, to a certain degree, determine the extent of permanent change, since inflammation with damage to the mucous membrane determines an altered physiology of the gallbladder. Inflammation may develop and subside without producing obstruction in the gallbladder or the hepatic and common ducts; but the narrow channel in the cystic duct is more readily occluded under the same circumstances and hydrops or empyema of the gallbladder may follow.[10]

Anatomic relations [11] of the cystic duct to adjacent organs predispose it to pathologic changes. The venous plexus covering the cystic duct may involve the duct, especially when thrombophlebitis or thrombosis of the veins takes place. The cystic artery, too, may be involved in an inflammatory process and cause a change in the vascularity of this part. The following outline, slightly modified from the *important paper by Cole and* Rossiter,[12] summarizes the common causes of cystic duct obstruction:

1. Stone or stones in the cystic duct.[13]
2. Stenosis produced by a thickened wall.
3. Stenosis produced by surrounding adhesions.

4. Twists, kinks and valvelike anomalies: (a) developmental, (b) congenital, (c) acquired, (d) inflammatory.
5. Congenital or inflammatory lesions[14] involving "valves" of Heister: (a) fibrous strands, (b) local thickening of the wall, (c) stricture due to scar following ulceration.
6. Tension induced by an enlarged liver, visceroptosis or loss of pericystic fat.
7. Compression or filling defect due to tumor[15] or lymph nodes.
8. Obstruction due to an anomalous hepatic or cystic artery.

It has been pointed out that allergic[16] cholecystitis is an entity, and Necheles[17] reported the finding of an eosinophile mucus plug obstructing a cystic duct.

CLINICAL APPLICATION

Any regimen which would facilitate the passage of bile into and out from the gallbladder would reduce the incidence of symptoms related to the filling and emptying of the gallbladder.

Hepatic bile usually is sufficiently dilute to pass readily into the gallbladder. In this organ bile is concentrated from two to ten times, depending on the content of solids in the hepatic bile. On leaving the gallbladder the concentrated bile, mixed with mucus, is thicker and does not pass through the narrow duct with the same ease that dilute hepatic bile entered this organ. Even in the absence of any degree of obstruction a concentrated bile may have such impaired passage that the tension in the contracting gallbladder produced by a normal response of the gallbladder musculature to an adequate stimulus results in acute pain similar to the distress induced by acute spasm of the duodenal musculature or the sphinter of Oddi. Concentrated bile also favors precipitation of bile pigment and cholesterol. Small stones so formed may lodge in the cuplike "valves" in the cystic duct and produce complete obstruction. Further, a concentrated bile may be more irritating chemically or allergically to a sensitive mucous membrane and result in inflammation with occlusion. Thus, any condition which favors a concentrated bile or any condition which favors prolonged storage of bile will predispose to gallbladder disease.

Common causes for a concentrated bile are hypohydration due to inadequate intake of fluids or excessive loss of fluids. A history of typhoid fever, pneumonia or other febrile disease of extended duration during the years when intravenous fluids and specific therapy were not as available as they are today is frequently noted in patients with gallbladder disease. It is likely that in these conditions concentration of bile may have predisposed to gallstone formation and gallbladder disease. Adequate hydration in any febrile disease as well as under normal circumstances is of importance in maintaining a dilute bile and preventing the ill effects of a concentrated bile.

Associated with this, the frequent emptying of the gallbladder of its dilute bile will "flush" the cystic duct and prevent stagnation of bile in the gall bladder. Since fat is the normal stimulus for gallbladder contraction,[18] it must be included in the diet at least once and preferably more often each day. The obese patient who "diets" to reduce by eliminating fat may allow precipitation of pigments and cholesterol in the stagnant bile of the nonemptying gallbladder. In pregnancy, too, stagnation occurs, and stimulation of this organ with fat in the diet may be a specific necessity. The anatomic possibility of pancreatic juice entering the gallbladder[19] and inducing chemical changes which favor precipitation also warrants frequent emptying of the gallbladder. A freely flowing dilute bile may avoid some of the causes for the development of acute duct obstruction with gallbladder disease.

SURGICAL ACCIDENTS

The cystic duct may be fixed to the hepatic duct or lie adjacent to the hepatic artery so that ligations of either of these important structures may be done by accident. A short cystic duct may be completely overlooked and the common duct may be ligated or clamped. In addition, clamping of the cystic duct may kink the hepatic or common duct with resulting postoperative jaundice. Insecure ligation of the cystic duct may result in an extensive accumulation of bile in the subhepatic and also in the subdiaphragmatic space. Stricture of the hepatic or common duct [20] following cholecystectomy either immediately or more remotely after operation frequently requires a formidable operation for relief of jaundice caused by the mechanical obstruction. Despite the ingenious and highly technical operations which have been devised to relieve the patient, the development of liver damage often determines a fatal outcome. Thus, in gallbladder surgery satisfactory exposure of the cystic duct is essential to avoid the complications so frequently discussed in the surgical literature.

SEQUELAE TO CHOLECYSTECTOMY

The causes for persistence of symptoms following cholecystectomy fall into three groups: (1) Failure to remove the cause of symptoms other than the diseased gallbladder. (2) Spastic disturbances in adjacent organs giving rise to symptoms like those in gallbladder disease. (3) Failure to remove the gallbladder completely, especially the neck and the cystic duct.

Failure to Remove the Cause of Symptoms, Other than the Gallbladder. It has been estimated that 20 per cent of the adult population have stones in the gallbladder.[21] The finding of stones in a patient with symptoms referable to the upper abdomen does not necessarily indicate that they are the cause of the symptoms. Other diseases may be present such as an inflamed appendix, chronic bowel distress, esophageal hiatus hernia, visceral carcinoma, allergy, cholangitis, hepatitis, peptic ulcer, pancreatitis, mesenteric adenitis, diverticulitis, and extraabdominal conditions such as intercostal neuritis, thoracic arthritis, myositis, pleuritis, etc. The removal of a gallbladder with stones when the symptoms did not originate from gallbladder disease is not likely to be followed by relief of symptoms. This error may be avoided by a more accurate diagnosis. Also, when cholecystectomy is undertaken, an adequate abdominal exploration should be done prior to the removal of the gallbladder to determine the presence of other pathologic conditions that may be responsible for the patient's symptoms.

Spastic disturbances involving the sphincter of Oddi, duodenum, pylorus, antrum and colon frequently simulate the dyskinesia,[22] dystonia [23] or dyssynergia [24] of the noncalculous gallbladder. The removal of the gallbladder does not remove the fundamental cause of the symptoms related to the nervous system and it is likely the symptoms will persist following cholecystectomy.

Failure to remove the gallbladder, more especially its distal portion, results frequently in persistence of symptoms.[25] Many case reports have been published indicating that relief from persistent symptoms following cholecystectomy has followed reoperation with removal of the stump of the cystic duct.

The distal end of the cystic duct (pars glabra) tends to dilate sometimes to the size of a small gallbladder.[26] This is not a regeneration of the gallbladder. The absence of musculature here favors stagnation of bile with stone formation. A stone situated here may obstruct the hepatic or the common duct and produce jaundice. The extensive network of nerve ganglia about the cystic duct may account for the persistence of symptoms following distention of this stump.

SUMMARY

The cystic duct though small is situated anatomically at a site where it may determine extensive and even fatal disease of the liver. Accidents due to surgery involving the ducts are exceedingly disabling and may be fatal, as from acute hemorrhage or chronic liver disease following stricture of the common duct. A remnant may determine a chronic state of "gallbladder disease" in the absence of the gallbladder. It is suggested that a freely flowing thin bile may avoid stone formation and the serious effects of obstruction of the cystic duct.

SOMMAIRE

Le conduit cystique, quoique petit est situé anatomiquement où il peut déterminer des lésions étendues et parfois fatales du foie. Les accidents dus à la chirurgie intéressant les conduits biliaires sont sérieux. Il peuvent être fatals. Une hémorragie aiguë où une maladie chronique du foie, consécutive à un

retrécissement du cholédoque sont des accidents postopératoires. Un débris de la vesicule biliaire peut déterminer un état chronique qu'on désigne parfois maladie de la vésicule biliaire. L'auteur suggère que l'écoulement facile et abondant d'une bile très fluide peut empêcher la formation de calculs biliaires et les conséquences sérieuses résultant de l'obstruction du conduit kystique.

RIASSUNTO

Per quanto sottile, il dotto cistico ha una sede anatomica per la quale puo' determinare estese e talvolta fatali lesioni del fegato. Incidenti dovuti ad interventi operativi interessanti i dotti cistici possono essere immediati, quali emorragie acute, o terminare in un' affezione cronica del fegato qualora si determini una restrizione del coledoco. La persistenza di un piccolo tratto del dotto cistico puo' condurre ad una sindrome che ricopia quella della cistifellea, anche se asportata. Un libero deflusso della bile, non ispessita da ristagno, e' da considerarsi la condizione migliore per evitare la formazione di calcoli e le conseguenze, relativamente serie, di un' ostruzione del dotto cistico.

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Considerations in the Preoperative and Postoperative Management of Patients Requiring Gastrostomy*

JACOB A. GLASSMAN, M.D., A.I.C.S.
CHICAGO, ILLINOIS

GASTROSTOMY is an operation in which pre- and postoperative management may, to a large extent, determine the success of the operation regardless of the type of procedure employed. Of all gastric operations, gastrostomy is among those not well understood and often neglected. Since gastrostomy at best is a palliative procedure a subconscious sense of hopelessness may cause the surgeon to take half-hearted measures in the preparation and after-care of these patients.

The primary purpose of this paper is to direct attention to a detailed and workable preoperative and postoperative plan for patients in whom gastrostomy is indicated. The second is to call attention to and stress the direct relationship that exists between preoperative and postoperative management and the successful outcome of a gastrostomy operation.

When a patient with carcinoma of the esophagus is told for the first time that he must have a gastrostomy, he is horrified by the thought of having to go through life artificially nourishing himself by tubal feedings. Almost invariably he will refuse the operation and express his preference to return home with some alternative plan of his own for feeding himself. After several weeks of unsuccessful efforts at doing so, the patient returns, psychologically prepared to accept any relief which will stave off impending death by starvation.

At this time the surgeon is confronted by a patient who is extremely weakened, dehydrated and emaciated. Further study reveals that these patients suffer from a severe protein deficiency that makes them unfit to withstand a major surgical procedure. The body, in an effort to sustain life during starvation, breaks down its own stores of fat, glycogen, and tissue protein. When such a catabolic process sets in and continues unabated, death is inevitable.

Heroic efforts in the form of immediate surgical intervention during this rapid breakdown phase, in an effort to feed the patient directly into the stomach, will accomplish little in the way of preventing death by starvation. Yet, not infrequently, one sees a patient with carcinoma of the esophagus brought in for an "emergency gastrostomy." The rationale of such a procedure is questionable at any time. What benefit can a markedly emaciated and dehydrated patient possibly receive from direct tubal feedings that cannot be surpassed a hundred-fold by the systematic intravenous administration of measured quantities of blood, plasma, dextrose in distilled water, normal physiologic salt solution, concentrated vitamins, and amino acids? I would like to reiterate that in the case of an obstructing carcinoma of the esophagus no emergency or urgency exists for performing a gastrostomy so long as there are available adequate facilities for carrying out a proper preoperative program.

A patient with carcinoma of the esophagus is considered ready for gastrostomy when dehydration is overcome, sugar stores replenished, vitamin deficiencies improved and, if possible, total proteins restored. The condition of a person in need of a gastrostomy can only be made worse by surgery when the preoperative management is not carried out properly. Likewise, the postoperative plan is routinely carried out. An acceptable plan for pre- and postoperative management of gastrostomy patients is dedicated to the principle that existing abnormalities and deficiencies must be improved before the patient is subjected to surgery. Such a plan is suggested below.

Food by mouth is withheld from the patient, not even water being allowed by mouth. Parenteral nourishment can be utilized so satisfactorily, that it leaves little to be desired.

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* From the services of Dr. Raymond W. McNealy at Cook County Hospital and Wesley Memorial Hospital, Chicago Illinois.

PREOPERATIVE PROCEDURE[1]

A. Workup:

1. Urinalysis.
2. Complete blood count.
3. Wassermann or Kahn.
4. Total protein determinations.
5. A-G ratio.
6. Attempts to aspirate stomach contents are not recommended because of the hazard of perforating the wall of the esophagus.
7. Type and cross-match blood. (Have two donors available before, during, and after surgery.)

B. Medication:

1. Antiseptic mouth washes.
2. Night medication (hypodermic).
3. Cevitamic Acid (1000 mg. daily).
4. 1 ampule of vitamin B complex (Solu-B, 1 ampule) intravenously.
5. Transfusions repeated if necessary.
6. Parenteral fluids.
   - a. 2000 cc. of 5% dextrose in distilled water.
   - b. 1000 cc. physiologic saline.
7. Parenamine (or any good proprietary brand of amino acids), 60 to 150 Gm. daily.
8. Morphine sulfate, gr. 1/6 } 1 hour before surgery
   Scopolamine, gr. 1/150

C Management:

1. SS enema (night before surgery).
2. Nothing by mouth.
3. Abdominoperineal prep. (breast to mid-thighs).
4. On call to Surgery (15 min. before surgery).

POSTOPERATIVE PROCEDURE

A Medication:

1. Continue with the above preoperative orders until tubal feedings can be safely instituted.
2. Morphine sulfate, gr. 1/6, P.R.N. for pain and restlessness.

B. Management:

1. The patient is fed by tube after a stoma is established.
2. Formula for a 24-hour period:
   - a. *Recipe:*
     1000 cc. homogenized milk
     500 cc. cream
     300 cc. orange juice
     4 eggs
     5 Gm. sucrose (5 tablespoonfuls)
     5 Gm. salt (1 teaspoonful)
     5 Gm. yeast (1 cake)
     2 oz. liver extract
     Cod or haliver oil, 20 min.
     Amino acids (Parenamine, protein hydrolysate, or Amigen), 60 to 150 Gm.
   - b. *Preparation:*
     Mix milk, cream and solids; add well-beaten eggs. Gradually add orange juice; add vitamins last.

The completed formula is kept in the refrigerator, but the feedings are given at room temperature in amounts varying from 4 to 12 ounces or more, depending upon the patient's tolerance. Do not forcibly inject the feedings, but rather allow the feeding to flow into the stomach by gravity. The patient should be instructed to pinch the catheter before removing it from the stoma as a precaution against spillage upon the abdominal wall. At first, I prefer to use a 14 F. catheter when feeding the patient, but the size is gradually increased to an 18 F. and even a 24 F. catheter. The skin about the gastrostomy stoma is protected with aluminum paint or paste. This prevents the skin from being irritated and possibly digested by gastric juice, which is constantly being secreted by the lining of the gastric tube. A small cotton-ball placed directly over the stoma and covered with a piece of gauze will absorb whatever gastric juice may form from the tubal lining in the period between feedings.

Unfortunately, patients with a gastrostomy are discharged from the hospital with no other instructions than how to prepare their diets and manage their feedings. Occasional visits to the doctor's office may be recommended.

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[1] McNealy, Raymond W.: Pre- and Postoperative Management. In preparation

In my opinion, the life of a gastrostomy patient might be appreciably prolonged and rendered more livable were the surgeon to keep in mind that a patient feeding himself artificially may stave off starvation but by no means stop the progress of the carcinomatous growth. The carcinoma continues to grow, invade, and metastasize despite the palliative surgical procedure. The growth of the carcinoma necessitates a greater utilization of nitrogenous material which it derives from the ingested food and the breakdown of tissue protein. This catabolic state leads to severe malnutrition, weakness, anemia, and *susceptibility to infection.* So long as the latter complication does not intervene, I believe the patient's downward course can be periodically interrupted with a booster regimen as outlined under preoperative management above. That would necessitate having the patient enter the hospital at three- or four-week intervals to receive a blood transfusion and supplemental amounts of sugar, water, salt, vitamins, minerals, and proteins.

In my experience, the above procedure has effectively prolonged the life of gastrostomy patients from 10 to 30 per cent beyond previous survival limits.

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Dupuytren's Contracture of the Foot[*]

HENRY W. MEYERDING, M.D., F.A.C.S., F.I.C.S. AND
JOHN G. SHELLITO, M.D.
ROCHESTER, MINNESOTA

DUPUYTREN,[5,6] in 1832, in 2 instances mentioned the lesions of the feet involving plantar fascia simulating the contracture which bears his name and which involves the palmar fascia in the hands. That there is a contracture of the foot, either associated or not associated with the same type of lesion in the hand, has been recognized since that time. Although the writings on Dupuytren's contracture of the hand are voluminous, there are few descriptions of a similar lesion in the plantar region. In more recent literature Kanavel, Koch and Mason,[10] in 1929, reported 2 cases of plantar lesions. In 1934, Powers mentioned 9 cases.[16] In 1936, one of us (H.W.M.)[13] found, in a study of 273 contractures of the hands, that 4 patients had a similar bilateral involvement of the feet. In 1939, Greenberg[7] discussed the subject of the association of palmar and plantar Dupuytren's contracture and mentioned 1 case in which the patient had involvement of both hands and the right foot.

Sir Astley Cooper[2] is credited by Hancock with recognition of the pathologic changes of Dupuytren's contracture and with describing the condition in the literature prior to the reports of Dupuytren.

In 1948 one of us (H.W.M.) discussed Luck's report[11] of 14 cases in which all patients had bilateral involvement of the hands and an associated plantar lesion; of these 14 patients, 2 had involvement of only one foot and 12 had involvement of both feet. Nine of these 14 patients underwent surgical excision.

MATERIALS AND METHODS

In our study we have reviewed all cases of Dupuytren's contracture in which the patient was seen at the Mayo Clinic from 1928 through 1947; in 24 (2.7 per cent) of these 882 cases there was involvement of the feet or a foot. In these cases we studied the hereditary factors, history of trauma, location of the lesion, association with lesions of the hand and the occupation of the patient, and in those cases in which the patient underwent operation we reviewed the microscopic findings. We have also made an attempt to evaluate the results of surgical treatment and the value of roentgen therapy.

The average physician, unfamiliar with the lesion of the plantar fascia, seldom looks for involvement of the feet in his examination of the patient who has Dupuytren's contracture involving the hands. Because of this fact, the cases available for study are not as numerous as they might be. Patients who have Dupuytren's contracture of the feet may be fitted with arch supports or special shoes, without relief of symptoms. In every case in which the patient has Dupuytren's contracture of the palmar fascia, the soles of the feet should be examined to determine whether or not there is involvement of the plantar fascia. The case illustrated in Figure 1 has been reported in full by Jackson and one of us (H.W.M.).[14]

The lesion may be more readily discovered by dorsiflexion of the foot and toes, which tautens the plantar fascia and the flexor tendons, with the result that the contracture becomes more evident. In Dupuytren's contracture of the foot one might expect to find plantar flexion of the toes, analogous to the flexion of the fingers seen in similar lesions of the hands, but we have not observed any severe degree of flexion in our cases.

The actual discovery of the lesion in the foot was often made after recognition of Dupuytren's contracture of one or both hands. In one of our cases, the patient underwent operation for Dupuytren's contracture of the left foot, and bilateral involvement of both hands and the right foot later developed. In 12 (50 per cent) of the 24 cases in this series plantar nodules or contractures were associated with lesions of the hands. In the

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[*] From the Section on Orthopedic Surgery, Mayo Clinic, Rochester, Minnesota.

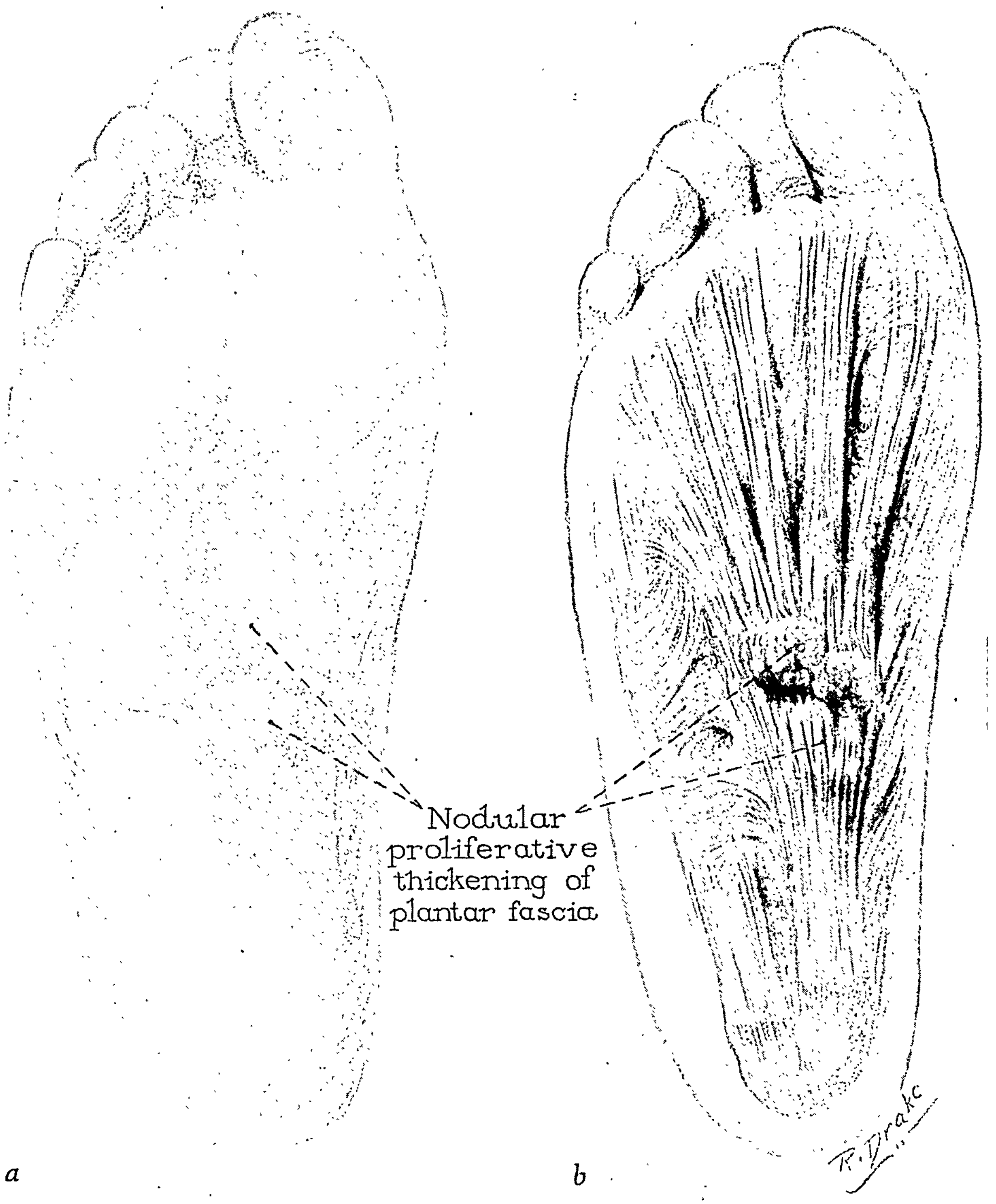

Fig. 1. a, Nodular tumorlike masses in the plantar fascia of the arch of the foot; b, plantar fascia exposed and type of involvement found at time of operation.

other 12 cases of lesions of the plantar fascia there was no involvement of the hands. Six of the patients of this latter group came to the clinic because of nodules or "tumors" of the feet; 2 came because of pain and aching, and 4 sought further surgical advice

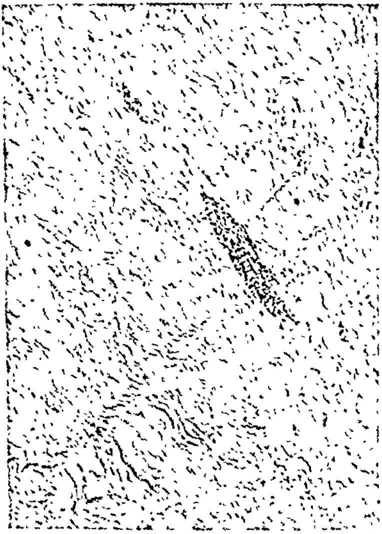

Fig. 2. Resting stage. Closely packed fibrous tissue with little cellular activity and small nuclei. ×85.

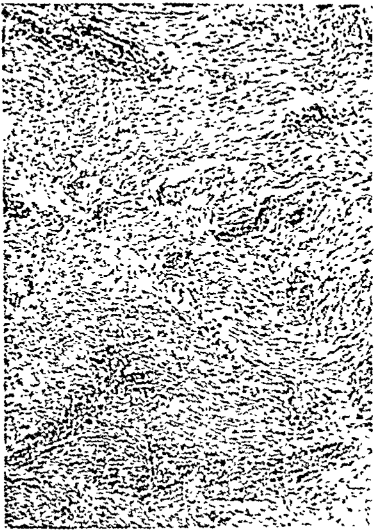

Fig. 3. Late active stage. Perivascular round cell infiltration with increased nuclear markings ×85.

after excision elsewhere of a tumor of the arch of the foot, on which a diagnosis of malignancy had been based. In 1 of the foregoing cases, the patient had undergone operation, a diagnosis of fibrosarcoma had been made and amputation had been advised.

The lesion usually is in the form of one or more palpable nodules involving the arch of the foot. It was found that the tumorlike nodules were composed of fibrous tissue and involved the plantar fascia along the longitudinal arch, and that there was a tendency for linear extension. The skin over the arch of the foot often may be dimpled, fissured or fixed as a result of fibrosis.

Of the total number of cases of contracture of the plantar fascia, the right foot was involved in 6 cases, the left in 6 cases and there was bilateral involvement in 12 cases. A history of trauma, such as cuts, abrasions, nails in the shoes and so forth, was obtained in 7 (29 per cent) of the cases. Of the 24 patients seen, 8 were housewives, 2 were physicians, 2 were lawyers, 2 were students, 4 were waiters, and 1 each was a carpenter, a common laborer, an executive, a plasterer and a salesman; 1 had no occupation. Hereditary factors were evaluated to the best of the patient's knowledge in each case. Inquiry revealed 2 cases in which there was a history of Dupuytren's contracture in the family; one patient's father and the other's mother had had it. The condition was almost evenly divided between the sexes, as there were 13 males and 11 females. The youngest patient was 13 years of age and the oldest 61 years, with a mean age of about 39 years. The duration of symptoms was unknown in 7 of the cases; the mean duration in the remaining 17 cases was about eight years. The shortest duration of symptoms was six months and the longest was 25 years. The result of the flocculation test for syphilis was not significant; of the 24 patients, 23 had a negative reaction and 1 had a positive reaction.

In no case was there associated Peyronie's

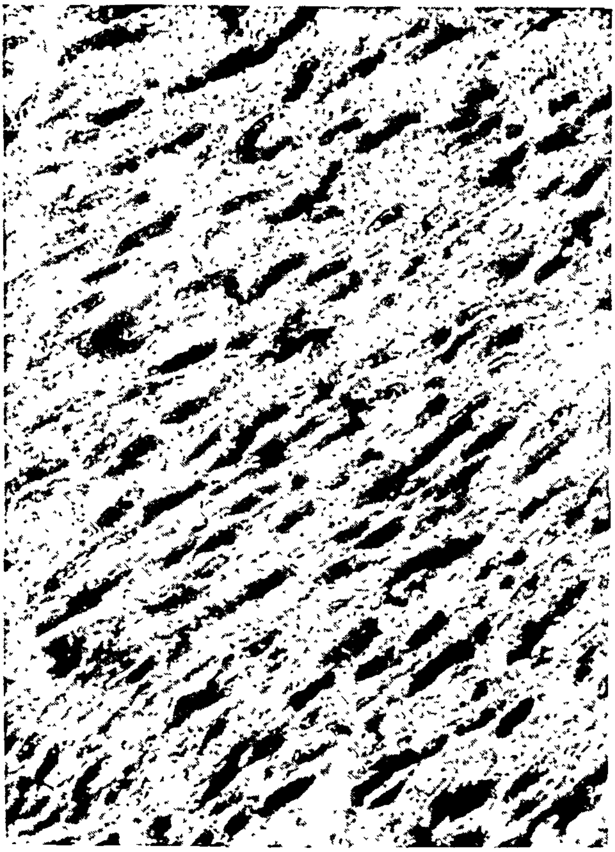

Fig. 4. Active stage. Active cellular proliferation with dark, hyperchromatic-staining nuclei and loose fascial strands. ×400.

disease, in which there is fibrous contracture of the penis; this has been noticed by others in connection with the lesions of the hand.

PATHOLOGIC FINDINGS

The microscopic findings were reviewed in the cases in which operation was performed at the clinic. In addition there was 1 case in which we had examined the tissue sent to us, but this tissue was not available for our review study. In 5 of the cases reviewed the tissue removed was found to consist of fibrous tissue, closely packed, with small light-staining nuclei between the strands. There was very little evidence of perivascular infiltration or of cellular activity. These cases were in the so-called resting stage as shown in Figure 2. Nine cases showed evidence of chronic inflammation, and were good examples of increased nuclear markings, perivascular round-cell infiltration and nodular proliferation of fascia as shown in Figure 3. Cases in which the findings might be mistaken for those of sarcoma were those which showed increased cellular proliferation; dark hyperchromatic nuclei, dark-staining round cells between the loose fascial strands, evidence of increased blood supply and perivascular round-cell proliferation as shown in Figures 3 and 4. These stages or changes seen in the tissue removed at operation were interpreted as being the result of chronic inflammation.

The course and appearance of plantar Dupuytren's contracture, we feel, is best divided into two stages: (1) the active stage, early in the disease, with gross evidence of formation of nodules, tenderness and slight pain, and microscopic evidence of increased fibroblastic activity with cellular proliferation and perivascular round-cell infiltration; (2) the resting stage, late in the disease, with hard, nontender nodules, fascial scarring and contracture, and a microscopic picture of dense fibrous tissue, closely packed nuclei and loss of surrounding areolar substance.

ROENTGENOGRAPHIC FINDINGS

The roentgenographic examination was found to be of negative value in our study of this disease, as the report was negative for bone changes in all cases. These findings would be of value, however, when there was a question of tumor formation and the surgeon wished to know whether or not there was involvement of bone.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis of this disease must be made from other conditions of the feet, such as scars from previous trauma, callosities, benign fibroma, chondroma, exostosis and fibrosarcoma. There were 2 cases in our series in which the contracture in the active stage could have been mistaken for a malignant lesion. If the pathologist or the surgeon will bear in mind that the cellular microscopic appearance of Dupuytren's contracture may show active fibroplasia and even mitoses, this error may be avoided.

TREATMENT

The treatment of this disease is complete surgical excision of the involved regions of plantar fascia. The incision usually is slightly curved mesially at the arch of the foot; the plantar fascia is then exposed, dissected free proximally to the contracture by tunnelling beneath, grasped with an artery forceps and divided, after which it is lifted from its bed by dissection carried distally. Hemostasis should be meticulously carried out. Because the toes are not as extensively involved in the foot as are the fingers of the hand, it is seldom necessary to make an extensive lateral dissection of the fascia about the toes. In our series of 24 cases, operation was performed in 14 cases. Of these 14 cases, there were 2 in which bilateral excision of the plantar fascia was performed, 8 in which excision of the contracture from the right foot was performed and 4 in which excision of the contracture from the left foot was performed.

Roentgen therapy was used as a postoperative adjunct in 3 cases; it was not used as the sole method of treatment in any of our cases. We have not employed penicillin or other new drugs as an adjunct to the treatment of patients who had Dupuytren's contracture of the feet.* Vitamin E or the tocopherols have not been utilized to any extent in the treatment of our patients and at the present time we are unable to comment on their value.

ETIOLOGIC HYPOTHESES

The etiologic hypotheses concerning this disease are many and varied. Dupuytren[5, 6] felt that occupation, when it involved the use of the hands, and continued and sustained trauma, were very important aggravating factors. We are still of the same opinion today.

Hancock[8] expressed the opinion that the disease is not a definite entity, but that it represents a biochemical or metabolic disturbance akin to gout or rheumatism, and that focal infection and trauma may be contributing factors

In association with Black and Broders, one of us (H.W.M.)[15] in 1941 studied the microscopic sections of Dupuytren's contracture and came to the conclusion that the pathologic picture was best explained on the basis of a chronic inflammatory process, aggravated by repeated trauma.

In 1944, Corlette[3] studied this disease and stated that the most likely alternative was that all cases of Dupuytren's contracture were familial and would always be found so if the descent and complete family history were known. In 1939, Mason[12] also expressed the belief that heredity was the most important etiologic factor.

In 1942, Horwitz[9] felt that the essential process was benign fibroplasia, or fibroblastic diathesis, and that this process bore a striking resemblance to keloid and fascial desmoid. He also felt that heredity and senility were important predisposing factors.

In 1944, Clay[1] expressed the opinion that this disease was explained on the basis of neoplasm of the fascial fibroma group.

Other authors have advanced many other hypotheses as to the cause of this lesion. These hypotheses embrace trauma, heredity, focus of infection, occupation, neurogenic factors and others.

Comment on Etiology. In this condition we feel that the degree of contracture and fibrosis is aggravated by trauma and function, thus causing progression of the lesion, with resultant deformity and increasing disability. It has still to be proved that trauma is the actual exciting agent in Dupuytren's contracture of the foot.

We have found in our own cases that heredity is given as a factor in approximately 8 per cent, although there were instances in which no inquiry as to the heredity was made. We therefore feel that it is doubtless a predisposing factor in the disease.

In our previous studies of Dupuytren's contracture,[13] the presence of foci of infection elsewhere in the body usually was compatible with the patient's age. We feel that infection does not have an important influence, although it may contribute to the condition by liberation of toxins. We feel that the trauma involved in certain occupations also may [illegible]ating factor. Although the condition is found in lawyers, physicians and executives, these patients may have sustained injuries or performed hard labor early in life.

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* Dr Douglas Dickson[4] observed 1 case in which the patient had Dupuytren's contracture of the hand accompanied by postoperative swelling, and in which penicillin was administered with beneficial results. We have observed an apparent improvement in a case of Dupuytren's contracture of the hands, in which the patient had not undergone operation and was given penicillin.

The suggestion that reflex or atrophic changes of the central nervous system may constitute a cause of this disease is interesting, but we do not feel that we have definite proof to substantiate such a conception. It is our impression that the condition is more prevalent among older patients whose circulation is not adequate, with the resultant degenerative changes, and whose hands and feet may have been subjected to trauma with injury of the fascia, and subsequent reparative fibrosis. In some instances the condition is further aggravated by chronic infection.

The periodic episodes of aching pain and tenderness associated with subcutaneous localized nodules of the soles of the feet, as well as microscopic findings, do not appear to us to be compatible with a neurogenic lesion.

During previous studies of this condition in the hand [15] it was observed that chronic inflammatory change usually is found in cases of Dupuytren's contracture. This study of the condition in the foot substantiates this opinion. Grossly, the nodules and cords form in the fibrous tissue of the plantar fascia, and these nodules and cords later become a thickened mass in the mesial side of the arch of the foot. In the early active stage there are foci of fascial and focal necrosis surrounded by low-grade inflammation. New growing nodules will show evidence of round-cell perivascular infiltration, will exhibit, immature fibroblasts and nuclei and will often simulate a tumor-like mass. Hence, these new nodules represent the early stage of fibrosis, and it is at this stage that the histopathologic examination of the tissue might be interpreted as showing fibrosarcoma, an interpretation which in fact had been made in 4 of our cases. As the fibroblastic process extends, the subcutaneous areolar tissue is replaced and destroyed in varying degrees. As the contracture becomes thicker and more nodular, the adjacent skin becomes fixed to the mass. In the advanced stage of the disease, there will be seen only mature fibrous tissue with almost no nuclei and scar formation. This last condition might be called a "resting" stage.

CASE REPORTS

Case 1. In this case of Dupuytren's contracture of the plantar fascia operation had been performed and a diagnosis of a malignant lesion had been made prior to admission at the clinic. A waitress, 32 years of age, was seen in December, 1928, at which time she stated that about 13 years prior to examination she had slipped on a door sill and felt something give way in the right foot. A month later she had noticed a small mass in the arch of the foot which gradually increased in size and became painful. She further stated that about 7 years prior to admission operation had been performed; she had been informed that the condition was cancerous and amputation of her leg had been advised. After this operation the mass had grown more rapidly and a similar mass had appeared in the sole of the left foot. Two years later she had consulted another physician and had been advised to have her teeth removed as they were causing her trouble. The teeth were extracted without improvement in the condition. One year before she was seen at the clinic she underwent operation again and masses were removed from the arches of both feet. There was recurrence of the masses after this operation and subsequently she had received radium and roentgen therapy.

Examination disclosed irregular, hard masses adherent to the skin of the soles of the feet with scars from previous operations (Fig. 5). The roentgenograms of the feet and the results of the blood examinations and flocculation test were negative. Operation was performed and a large portion of the plantar fascia was removed from both feet. The tumorlike masses were ¾ inch (about 2 cm.) in thickness and were adherent to the skin. The pathologist found dense, fibrous, hyaline tissue. The convalescence was uneventful and the incisions healed with primary union. The patient was dismissed a month after operation.

Case 2. This patient with bilateral Dupuytren's contracture of hands and feet was a salesman 34 years of age. The bilateral Dupuytren's contracture of the hands and feet (Fig. 6) was of 18 months' duration. There was no history of trauma or hereditary factors in his case. He did not have pain. He preferred having operation on the left hand performed. This was done. The pathologist reported fibrous tissue.

Case 3. Dupuytren's contracture of the left foot with subsequent involvement of both hands and

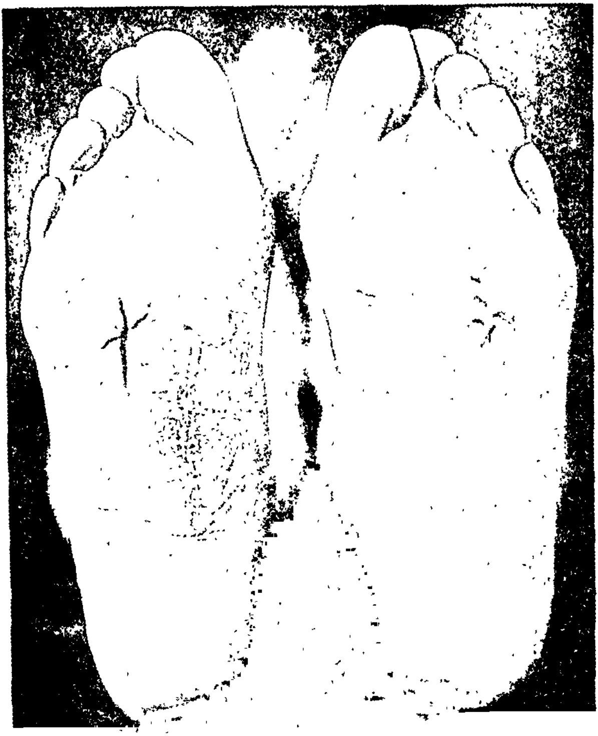

Fig. 5. Bilateral Dupuytren's contracture with hard, irregular masses and scars from previous operations (Case 1). A diagnosis of a malignant lesion had been made and amputation of the right leg had been advised.

the right foot occurred in a machine operator, 36 years of age. He was seen in 1945, at which time he gave a history of having dropped a 250-pound (about 113 kg.) weight on his left foot, crushing the left great toe, in 1939. He had undergone operation in 1910 and, because of persistent pain, amputation of the toe had been done in June, 1915. At the time of the latter operation, a tumor had been removed from the arch of the left foot and a diagnosis of fibroma or fibrosarcoma had been made. He stated, however, that he continued to have pain in the stump of the toe and arch of the foot which had interrupted his sleep, and he came to the clinic because of recurrence of the mass in the arch of this foot which had gradually increased in size.

We excised two neuromas from the digital nerve at the base of the left great toe. A hard, fixed tumor, 1½ inches (about 4 cm.) in length and 1 inch (about 2.5 cm.) in width, attached to the skin was found in the arch of the left foot. It involved the plantar fascia and was adherent to the underlying blood vessels, nerves and muscle. This mass was completely excised and the patholo-

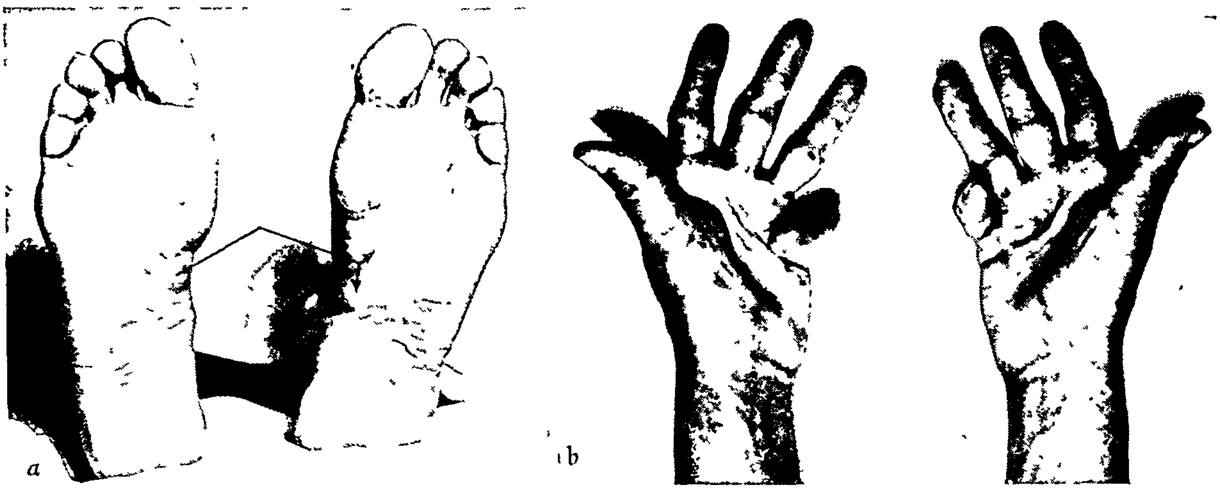

Fig. 6. a, Bilateral Dupuytren's contracture of the feet; b, bilateral Dupuytren's contracture of the hands in same patient (Case 2).

gist found nodular thickening of the plantar fascia with microscopic features of Dupuytren's contracture. The tissue from the great toe showed nerve tissue with neuroma formation. The patient was dismissed two weeks after his operation, at which time his incisions had healed with primary intention.

At the time when this paper was written, about two and a half years after operation, the physician at home reported that the patient showed evidences of Dupuytren's contracture involving the right foot and both hands.

SUMMARY

1. The feet were involved in 24 cases (approximately 2.7 per cent) of our series of 882 cases of Dupuytren's contracture in which the patients were seen at the Mayo Clinic in the period from 1928 through 1947. It is probable that if the clinicians had searched for the lesion in the foot more often, the incidence would have been higher.

2. The location of the lesion was usually on the plantar arch, proximal to the metatarsal heads. The average age of the patients was 39 years with the youngest one 13 years of age and the oldest 61 years of age. A history of trauma was obtained in 7 cases, and of hereditary factors in 2 cases Twelve patients had an associated lesion of the hands and 12 had involvement of the feet alone.

3. In our opinion the best etiologic explanation of this condition is a chronic inflammatory process aggravated by trauma and function, heredity, senility and occupation being predisposing factors

4. Care must be taken to differentiate this disease from fibrosarcoma, for which it may be easily mistaken if the microscopic section is taken during an active phase of the fibroblastic process. Round-cell perivascular infiltration, fibroblastic nodular proliferation, loss of areolar tissue and mitotic figures may be present.

5. The treatment of the disease is surgical excision of all of the involved plantar fascia.

SOMMAIRE

Dans 882 cas de maladie de Dupuytren pendant la periode de 1928 à 1947 inclus 24 cas intéressaient le pied. Il est probable que si les cliniciens avaient examiné plus souvent soigneusement les pieds, l'incidence aurait été plus élevée. Les lésions sont généralement situeés à l'arcade à plantaire à proximité de la tête des métatarses. L'âge moyen des malades était de 39 ans et le plus jeune avait 13 ans: le plus vieux l'âge de 61 ans. Dans 7 cas le lésion but précédée d'une traumatisme; dans 2 cas, il existait des facteurs héridítaires; 12 avaient une lésion associée des mains et dans les 12 autres la lésion était limitée aux pieds.

C'est notre opinion que l'explication étiologique de ces conditions est un procédé inflamatoire chronique aggravé par le trauma, par l'hérédité, la sénilité et l'occupation du malade.

Il faut différencier cette condition du fibrosarcome avec lequel elle est souvent con-

fondue. Il faut faire un examen d'une section microscopique pendant la phase active du procédé fibroblastique.

On peut rencontrer une prolifération des cellules rondes, une prolifération fibroblastique nodulaire, une perte de tissue aréolaire et des figures mitotiques.

L'excision chirurgicale de tout fascia plantaire attaqué est indiquée.

SUMARIO

En una serie de 882 casos de contractura de Dupuytren los pieses fueron afectados en 24 de los pacientes (2.7% aproximadamente). Esta serie que cubre el periodo de 1928 a 1947 inclusive posiblemente habria mostrado una incidencia mayor en las lesiones del pie si los clinicos hubieran prestado mas atencion a este miembro.

Las lesiones generalmente se encontraron en la superficie plantar de las cabezas de los metatarsos. La edad de los pacientes presento un average de 39 años, sin embargo el mas joven fue un caso de 19 años y el mas viejo fue 61. En 7 casos se obtuvo una historia de trauma y 2 presentaron factores de herencia; en 12 las lesiones ocurrieron solamente en el pie, y en otros doce casos ocurrieron en asociacion con contracturas de la mano. En nuestra opinion la mejor explanacion etiologica de estas lesiones es la inflamacion cronica la cual es agravada por el trauma y el uso; la herencia, la senilidad y la ocupacion del paciente son factores etiologicos predisponentes. En el estudio de las secciones microscopicas se debe de tomar cuidado de no confundir estas lesiones con el fibrosarcoma especialmente durante la fase activa de proliferacion fibroblastica. El tratamiento es quirurgico y consiste de la excision de toda la aponeurosis plantar que este afectada.

RIASSUNTO

Sopra 882 casi di contratture di Dupuytren esaminati nella clinica dal 1928 al 1947, in 24 casi (all'incirca nel 2,7%) la contrattura interessava i piedi. E' probabile che la percentuale sarebbe stata anche piu' elevata, se i medici avessero indagato con maggiore diligenza. La sede della lesione corrisponde generalmente all'arco plantare, in una zona prossimale alle teste dei metatarsi. L'eta' media dei pazienti e' di 39 anni; il piu' giovane aveva 13 anni: il piu' vecchio 61. In 7 casi esisteva nell'anamnesi la storia di un trauma: in 2 casi dei fattori ereditari. In 12 casi la lesione dei piedi era associata ad una lesione consimile delle mani: in 12 era invece limitata ai piedi.

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The Knee Joint

PHILIP LEWIN, M.D., F.A.C.S., F.I.C.S.
CHICAGO, ILLINOIS

THE knee joint is a mechanical unit, like a watch, an automobile or a machine gun. Any disturbance of one part of the unit affects the working of the apparatus as a whole. The knee is actually a poorly fitting joint. A cabinet maker might not acknowledge having made it, but he would boast about its performance. I shall describe in a simple way the development of the knee joint.

Nature put together the ends of the two longest bones in the body, the femur and the tibia. When bone meets bone, it makes a joint, providing it can find a capsule to surround the union. Because a joint needs lubrication, nature put a secreting lining in the capsule, which is called the synovial membrane. Still, the knee was a poor joint, with practically no freedom of movement. Nature, therefore, pulled the bones apart. Since they would not stay apart, she inserted two semilunar cartilages, first to act as joint spreaders, then as cushions and brake shoes. Still the bones had no force for movement; therefore, nature surrounded the joint with some of the strongest muscles in the body. She had to have more external stability, so she added the tibial and fibular collateral ligaments. There had to be internal stability to prevent excessive movements, so she interposed the anterior and posterior crucial ligaments. As though she had not solved one of her toughest mechanical jobs, nature added a patella, a fat pad and a group of bursae. The fibula makes another nearby joint.

As an indication of nature's success, I cite the fact that automotive engineers have paid her a great compliment when they applied the knee-action principle to automobiles.

Unlike the hip and shoulder, which have universal movement, the knee has a pure hinge motion with two supplementary components: (1) sliding and (2) rotation.

The great length of the femur and tibia throws tremendous leverage stress and strain upon the structures of the knee.

The knee joint is man's largest synovium-lined cavity. The biomechanics is not perfectly designed for its functional usage. The joint was constructed for the four-footed position and not for one in which the lower end of the femur bears directly in a vertical manner upon the upper end of the tibia. This change was brought about by the assumption of the upright posture. The elephant is said to be the only other animal whose hind legs are used with the femur vertically opposed to the tibia. The articular cartilage of the knee joint presents the largest surfaces of this kind in the body. These surfaces in health are smooth as a billiard ball and lubricated by synovial fluid, so that the complicated movements of flexion and extension are accomplished in a smooth, gliding manner. With the slightest variation of the smoothness of these articular cartilages, the surfaces begin to rub and grate.

In addition to being the largest joint in the body, the knee is the most frequently affected and infected.

Knee disturbances may be due to congenital, traumatic, static, metabolic, allergic, neoplastic and infectious causes. Lesions of the knee joint may be divided into internal and external derangements.

A miscellaneous group of conditions which might affect the knee includes hip conditions, abnormal conditions of the foot, intrapelvic lesions, hysteria, and endocrine disturbances.

Pathologic changes may be found in the bones, cartilage, synovial membrane, capsule, menisci, lateral ligaments, tibial spines, crucial ligaments, bursae and tendons.

Primary pain in the knee means a discomfort that originates in or around the bones, joints, synovial membrane, ligaments, fasciae, nerves and blood vessels. Secondary knee conditions may be produced by a focal infection in the gastrointestinal, genito-urinary or respiratory tracts, having toxic or infectious effects on structures in or around the knee. Removal of the primary cause may fail to cure the secondary lesion.

The examiner should be on his guard in

obtaining histories and while examining all patients when an industrial, traumatic, military or medicolegal aspect is involved. Industrial, compensation, and medicolegal aspects of such disorders as internal derangements of the knee, injuries to the internal and external ligaments, fractures and dislocations present special problems of diagnosis and treatment.

The prognosis in knee lesions should always be guarded. *It depends upon the etiologic* factors, pathologic changes, duration of the condition, persistence of the treatment, and the question of financial or other compensation.

Most of the chronic, unstable, incompetent knees that are seen from day to day could have been prevented if the first physician had made a correct, specific diagnosis and had instituted appropriate treatment immediately.

In certain cases the period of disability bears a direct relation to the duration of symptoms prior to operation. The guiding principle should be, "Early operation where an operation is, or undoubtedly will be, indicated."

Joint effusion which is an evidence of irritation of the synovial membrane may prolong convalescence.

Restoration of function and earning capacity *with freedom from pain are the crucial* points to be considered in determining the value of any procedure.

Knee injuries may be followed by a train of nervous symptoms which are out of proportion to the severity of the injury. Litigation or military reclassification makes the problem more complicated. The knee is a frequent retreat for slackers, exaggerators, and malingerers. Injuries even to normal knees may require long periods of recovery.

I am impressed with the analogy of knee and back disorders. Some of the points of similarity are: mechanical derangements, internal derangements, subjection to repeated injuries, vulnerability and multiple injuries.

Owing to world war and industrial and athletic activities, there has been awakened world wide interest in physical fitness. The *knee is an important factor in this program.* Examples of this are found in paratroopers and ski troopers. The knee problem is one of the most important during basic military training. In one army general hospital where I served, there was a period when I had seven knee cases to one foot case, one knee case to every back case, and one knee case to every fracture case.

Every so often a patient will say, "Doctor, I'm afraid to have my knee operated on because my best friend had a stiff knee following his operation."

The chief possibilities are:

1. *The surgeon might have performed a* fusion purposely.
2. It might not have been operated on soon enough.
3. Infection might have occurred.

Recent advances have been made toward a clearer understanding of lesions involving the menisci, the ligaments and the patellofemoral mechanism and in a standardization of surgical approaches as well as operative technics. The addition of modern chemotherapeutic agents to the established knowledge of asepsis and antisepsis has made surgery of the knee joint a very important and interesting subject.

There have been several outstanding contributions to the understanding of knee disorders during the past ten years. Most noteworthy are those of Voshell and Brantigan, Palmer, Friberg, Cave, Bosworth, Soto-Hall, West, *Smillie and Abbott and his colleagues.*

A turning point in the understanding of the ligaments by American orthopedic surgeons came when Brantigan and Voshell demonstrated their work on the biomechanics of the knee. In addition to their important contributions their studies stimulated much interest and research.

If a sufficient number of investigators discover the answers to one or two problems, there will come a time when the entire subject will be conquered.

The most important injuries of the soft tissues in and around the knee joint are:

1. Lacerations of the anterior and posterior crucial ligaments.
2. Tears of the collateral ligaments.
3. Lacerations of the synovial membrane.
4. Rupture of the capsule.
5. *Trauma to the bursae about the joint.*

Injuries to the synovial membrane are not very extensive unless the knee joint has been punctured by a foreign body or ruptured by a fracture into the joint. In the absence of infection, the membrane heals readily and without much limitation of joint motion.

The quadriceps muscle is the watchdog of the knee. It is the captain, quarterback and backfield of the knee's defense. At Mayo General Hospital I posted in every orthopedic ward a large sign which read:

HAVE YOU EXERCISED
YOUR QUADRICEPS TODAY?

It was very effective.

In the nonoperative treatment of serious injuries I emphasize the advice "early to bed" and maintain the tone and power of the "quadriceps extensor," if you wish "early to rise." In cases of injury to the knee joint no skeletal muscles lose tone as quickly as the quadriceps does. For this reason, precise instructions should be given to every patient before and after operation to retain and regain muscle tone. Electrical stimulation, especially by sinusoidal current, will supplement active movement and other physical therapy to retain and regain tone.

In many cases quadriceps exercises should be started several days before an operation and resumed immediately after operation.

The success of any operative procedure to repair the internal or external ligaments depends to a considerable degree on the power of the quadriceps muscle.

The knee situation boils down to:

1. Diagnosis
2. Surgery
of
Mechanical
Traumatic
Infectious
Neoplastic
Arthritic
Metabolic
Neuropathic
disorders

10 COMMANDMENTS OF KNEE SURGERY

1. Always take sufficient time to get an accurate and complete history.
2. Make a complete physical examination—include feet and pelvis.
3. Demand perfect x-rays in various projections.
4. In mechanical disorders be sure to make an accurate survey of the biomechanical difculty and correct it.
5. In infectious lesions be sure to use penicillin and other chemotherapeutic agents to the optimal point.
6. In traumatic cases be sure of normal alignment of the leg.
7. In neoplastic cases be sure to differentiate benign from malignant lesions and consult the radiologist regarding radiosensitivity of the lesion.
8. In metabolic lesions be sure to get the patient in optimal weight balance.
9. Be conservative but once surgery is required, do not delay.
10. Never fail to consult, in doubtful cases, with the roentgenologist or radiologist.

If the medical profession could be taught to place under proper surgical care patients with internal derangements of the knee, before they develop relaxation of the muscles, it would be a great step forward.

Some of my original conceptions have become convictions: (1) The term "internal derangements of the knee" had become a diagnostic dumping ground. The proximity of tissues and structures is no excuse for mass diagnosis. (2) Greater strides will be made when the best possible differential diagnoses are made during the immediate acute stage. (3) Exact anatomic diagnosis in acute injuries of the knee is of the utmost importance. (4) One should not attempt to reduce a displaced semilunar cartilage without full obliteration of pain and complete relaxation of muscle spasm. (5) Good collateral ligaments minimize the inadequacies of the crucial ligaments. (6) A strong quadriceps muscle makes up for considerable deficiency of the injured crucials and collaterals. (7) There is too much "brutal" manipulation of the knee. (8) Although there is no doubt that some internal and external ligaments of the knee have healed perfectly, early operation is preferred in those cases where a precise diagnosis can be made.

ANATOMIC FACTORS

Meniscus. The use of the term cartilage for a meniscus is confusing. I limit the term cartilage to the articular hyaline cartilage. I prefer the term meniscus for the structure semilunar cartilage. The plural of meniscus is meniscuses or menisci. Both meniscuses are internal, meaning intraarticular; one is medial; the other is lateral.

The knee joint contains two crescentic fibrocartilages called the medial and lateral menisci. They are buffers placed at the rim of the joint and help to deepen the sockets with which the femoral condyles articulate. They are moving wedges, which prevent displacement, especially laterally. They function normally until forced between the bones by rotation or until caught therein by some unusual movement of the knee. They are the shock absorbers which deepen the sockets on top of the tibia. About two-thirds of the surface into which the femoral condyles fit has thus "bushing" covered with membrane. The menisci are important, not only as shock absorbers, but also because of their wedge action. They are like brake shoes on a wagon or carriage. If one attempts to push the tibia sideways on the femur, he will find the condyles running up on the sides of the menisci. The higher the condyle rises on the meniscus, the tighter the ligaments become and the more firmly the knee is held.

The menisci cushion the articular surfaces of the femur during hyperextension and hyperflexion.

The medial meniscus is almost semicircular and is attached in front in a thin pointed margin to a depression on the head of the tibia just in front of the anterior crucial ligament. Behind, it is attached to a depression back of the tibial spine between the attachment of the lateral meniscus and the posterior crucial ligament. The lateral meniscus, almost circular, is larger than the medial and has a groove on its lateral side for the popliteus muscle. The anterior end is attached to the front of the tibial spine behind the anterior crucial ligament, with which it blends, the posterior end is fastened behind the tibial spine in front of the rear attachment of the medial meniscus. It gives off a strong fasciculus to be attached to the medial condyle of the femur, close to the attachment of the posterior crucial ligament. In front it gives off another band known as the transverse ligament. The medial meniscus is more vulnerable than the lateral because the latter is larger, more nearly circular, is grooved for a muscle, and its attachments in front and behind are better protected. It also has two fasciculi which serve as ligamentous anchorages. A mechanical weak spot exists where the movable anterior portion joins the comparatively fixed posterior portion of the meniscus.

The lateral meniscus is more circular, and its horns are attached to the tibia, one on each side of the tibial spine. The posterior horn usually has a strong ligamentous attachment to the posterior cruciate ligaments.

There is a groove on the peripheral aspect of the lateral meniscus where the popliteus tendon passes across it. The tendon prevents any close attachment between the lateral meniscus and the fibular collateral ligament, so that, in contradistinction to the medial meniscus, the lateral enjoys a considerable range of movement. Further, it moves as a whole, and there is no weak point between a movable and a fixed portion, as there is in the case of the medial meniscus.

The menisci further the adaptation of the tibial socket to the femoral condyles, they assist the lateral ligaments to check or prohibit exaggerated lateral movement of the joint and help in torsion movements of the knee.

Fisher has demonstrated that there are two nutritional zones in each meniscus; the peripheral is well vascularized, whereas the central zone is practically devoid of blood vessels and derives its nourishment from the synovial fluid.

Plica Articularis. The plica articularis is a membranous section of tissue forming a transverse partition that divides the suprapatellar portion of the synovial sac into compartments. It also forms a synovial pouch or pocket that may harbor loose bodies. It can produce symptoms that resemble those of meniscus derangements.

This embryologic remnant is important during aspirations and injections of the knee joint and explains some of the dry taps that are so disturbing to the surgeon.*

It explains

1. Many dry taps.
2. Failure to find loose bodies.
3. Pocketing of injections.

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* I have observed it [illegible] I emphasize [illegible]
the knee [illegible]

CLASSIFICATION OF KNEE DISORDERS

The subject of knee joint disturbances is readily divided into two groups—internal and external derangements.

Internal derangements include the following:

1. medial meniscus disorders
2. lateral meniscus disorders
3. crucial ligament rupture
4. tibial spine fractures
5. synovitis
6. arthritis
7. chondromalacia patellae
8. patellofemoral lesions
9. osteochondritis dissecans
10. osteochondromatosis—rice bodies—Hoffa's lesion of fat pad—lipoma arborescens
11. intermittent hydrarthrosis
12. bursitis—cysts
13. hemophilia
14. hemorrhage into the joint

External derangements include the following:

1. fracture of the patella
2. dislocation of the patella
3. quadriceps tendon rupture
4. quadriceps tendon adhesions
5. patellar tendon rupture
6. Osgood-Schlatter's lesion
7. bursitis—cysts
8. ruptured lateral ligaments
9. relaxed ligaments—Pellegrini-Stieda's lesion
10. tendinitis
11. fibrositis
12. miscellaneous conditions

ETIOLOGIC FACTORS

The most common mechanism in knee injury is the following:

1. Foot stops and becomes fixed
2. Body goes on
3. Knee flexes
4. Lateral thrust
    - a. intrinsic
    - b. extrinsic
   or
5. Inward rotation of femur
6. Outward rotation of tibia
7. Extension of knee
    - a. attempted
    - b. completed
   or

These are especially applicable to the menisci.

SYMPTOMS OF KNEE DISORDERS

The most important symptoms of knee disturbances are *discomfort, deformity* and *disability*. The chief symptoms are pain, limitation of motion, swelling, tenderness to touch, sensitiveness to movement, locking, crepitus, weakness and undependability. The pain usually is local. Weakness and buckling may be due to many factors, including pain. For the purposes of history taking the various

COMPLAINTS OF PERSONS WITH KNEE DISORDERS

Pain
Locking
Catching
Swelling
Stiffness
Weakness
Lameness—limp
Fatigue
Insecurity
Undependability
Instability
Frequent twists
Snapping
Clicking
Crepitus

Pinching
Grating
Grinding
Crackling
Crunching
Pulverizing
Giving way
Buckling
Crumpling
Inability to kneel
Inability to crawl
Deformity
Weather changes
Postinertial dyskinesia

Specific Questions Regarding Present Injury

NATURE OF INJURY

Direct violence
Indirect violence
Fall
Twist—squeeze
Overextension

Squatting
Walking
Running
Lateral force

MECHANOGENESIS

Position of leg
Application of force
Rotation of lower leg
  clockwise
  counter-clockwise

INTERROGATION REGARDING PAIN

Location
Referred
Constant
Intermittent
Dull or sharp

Aggravated by ....?
Relieved by .... ?
Diurnal variation in intensity
  during day
  during night

INTERROGATION REGARDING "LOCKING"

Instantaneous
Continuous
Intermittent

Reduction
  Spontaneous
  Easy
  Difficult
  By whom
  How

LIMITATION OF MOVEMENTS

Flexion
Extension

Degree
Degree

SWELLING

Location
Degree
Kind
Persistent

STABILITY OF KNEE

Hypermobility—excursion of tibia:
  forward
  backward
  laterally
  medialward

Wobbliness
  slipping
  snapping

complaints of persons with knee disorders may be charted as in the accompanying chart. Specific questions in history taking also may be charted as shown on page 609.

METHODS OF EXAMINATION

The physical examination must include the location of pain and tenderness, presence of swelling, limitation of motion, laxity and pain on precise movements or maneuvers, and tests of the joint.

A general minimal examination includes tests of reflexes, and sensations, examination of the feet, and the balance of the pelvis. A line drawing of the knee, with abnormal areas indicated, preferably in color, should be attached to every office, hospital and dispensary record.

The occurrence of pain and its exact site are of importance, and the joint must be very carefully palpated to localize any area of tenderness. The stability of the lateral and crucial ligaments must be tested, and the full range of painless movement carefully measured. The whole surface of the joint should be palpated while the patient flexes and extends it through its fullest possible range.

The following outline is amplified from an earlier article of mine published elsewhere.*

Routine sequence of examination of the knee comprises inspection, palpation, auscultation, neurologic examination and special tests.

INSPECTION

Standing
- Can patient stand unassisted?
- General appearance of knee
- Deformity? flexion+genu valgum+genu varum +genu recurvatum+torsion
- Anatomic location of affected area, as indicated by patient
- Normal landmarks: visible—obliterated
- Swelling (generalized, localized)
- Atrophy (quadriceps, calf)
- Does he tire quickly, while standing?
- Areas of pain
- Tenderness to pressure
- Sensitiveness to movements
- Is the quadriceps outline normal? Gap?
- Is the tibial tubercle normal?
- Valgus thrust: A thrust against the lateral border of the knee while it is flexed and in knockknee position.
- Resistance test: Kicking heavy objects of furniture around the room.

Sitting
- With knees flexed over side of examining table
  - Locking?
  - Degree of free movement
  - Degree of forced movement
  - Palpable crepitus (coarse, fine)

- With knees extended on examining table
  - General appearance of knee
  - Is the knee held in a flexed position?
  - Is the skin over the injured knee warmer than that over the other?
  - Other signs of inflammation?
  - Specific tender areas
  - Can patient squeeze examiner's hand against the table by forcibly extending his knees?
  - Is the patellar outline obliterated?
  - Is there a swelling?
  - Is it due to:
    - excess fluid
    - inflammation
    - hemorrhage
    - thickened membrane
  - Joint synovial distention
  - Bursa distention
  - Free fluid (+) or (—)
    - ("Milk" the lower thigh toward the knee)
    - Is it in the joint or in a bursa, especially suprapatellar?
    - Is aspiration indicated?
  - Patella
    - Mobility? Laterally? Longitudinally? Does it float?
    - Crepitus
    - Can you pick up capsule above patella?
  - Loose bodies
  - Blow on the heel, transmitted to knee
    - Does it produce pain?
  - Areas of pain
  - Tenderness to pressure
  - Sensitiveness to certain movements.

Walking
- Can patient walk without assistance?
- Does he need crutches or cane?
- Does patient limp?
- Does he walk on toes of affected leg?
- Does the knee buckle?
- Does he take steps of equal length?

Lying (supine and prone)
- Knees extended

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* Illinois M. J., January, 1927.

Sitting

Knees flexed — Drawer sign {Anterior / Posterior}

Kneeling

Can patient kneel on a chair?
Is it painful?

Squatting

Can patient squat down between his heels?
Is it painful?
Does it produce crepitus {palpable / audible}

PALPATION

Skin temperature
Character of swelling
Tender spots
Free fluid
Thickened membrane

AUSCULATION

Crepitus

NEUROLOGIC

Every physician should be able to make a neurologic examination. The equipment is simple: a percussion hammer, a pin, a wisp of cotton, a fountain pen or skin-marking pencil to outline skin areas, a test tube with hot water, another with ice water, and a tuning fork.

I have divided the subject into the following sections:

1. Station
2. Attitude
3. Ataxia
4. Gait
5. Coordination
6. Motor power: strength—range of movement
7. Reflex activity
8. Sensation: sensorium—tuning fork
9. Trophic changes
10. Local defects and lesions
11. Special clinical and laboratory tests
12. Spinal puncture is performed only in selected cases.

The examiner determines first whether the patient can voluntarily put his feet in dorsiflexion, plantar flexion, pronation and supination; second, whether these movements can be made passively; third, whether they can be made against resistance; fourth, whether the patient can feel the touch of the hand on all areas of the skin, and whether he can differentiate between the sharp and dull ends of a pin, between the sensation of a wisp of cotton and the stroking of a finger and between heat and cold applied by means of test tubes containing cold and warm water. The presence or absence of the Babinski reflex is determined by stroking the sole of the foot along the outer border. The proprioceptive sense is determined by moving the toes up and down and sidewise. Ataxia can be easily demonstrated. Sensory changes in leg, foot and toes. Motor power in muscle group of thigh, leg, foot and toes. Reflexes of quadriceps and tendo achillis.

SPECIAL TESTS

1. Specific tests for meniscus lesions:
    - Flexed knee
    - Tender spots
    - Palpable meniscus, out of normal location
    - Knock knee thrust
    - Bow leg thrust
    - Palpable cyst of meniscus
    - Fouche—Apley
    - McMurray

MEASUREMENTS	RIGHT	LEFT
At groin		
Mid-thigh		
1 inch above patella		
Around patella		
Garter line		
Around calf		
Above ankle		

2. Specific tests for crucial ligament lesions:
    - Leg hanging over table
    - Drawer sign or test
        - Anterior—forward excursion of tibia
        - Posterior—backward excursion of tibia
    - Lewin test—patient prone-lying, flexed knee position, drawer sign.
3. Specific tests for lateral ligament lesions
    - Knock knee thrust
    - Bow leg thrust
    - Locking patient's foot and leg between examiner's knees and applying lateral hand-pressure against knee
    - Torsion test forcing the lower leg
        - Clockwise
        - Counter clockwise
4. Test of stability and muscle power
    - Can the patient step up on a chair or stair using the affected knee?
5. Special tests for
    - Arthritis
    - Synovitis

Galeazzi devised an arthrogoniometer for measuring deviations of the knee. The ordinary protractor is used to measure degrees of movement.

Hypermobility.	Forced movements
Anteriorly	
Posteriorly	
Medially	
Laterally	
Car wheel excursion	

Examination of the Popliteal Area. It is a revelation to any examiner who tries for the first time to examine the contents of the popliteal region if he places the patient on the table in a prone-lying position and flexes his knee. The degree of relaxation of the tissues of the thigh, popliteal space and calf is surprising. The ability to palpate specific structures is remarkable, especially:

posterior capsule
bursae
posterior portions of the menisci
popliteus muscle
tendons $\left\{\begin{matrix}\text{inner}\\\text{outer}\end{matrix}\right\}$ hamstrings
aneurysm
pulse
nerve
crucial ligaments

Joint Movements	Active (degrees)	Passive (degrees)	Forced	Spasm	Areas of Tenderness
Flexion					
Extension					
Tibia forward					
Tibia backward					
Tibia laterally					
Rotation					
Forced					
Clockwise					
Counter Clockwise					

Examination Under Anesthesia. Short anesthesia by intravenous pentothal sodium is being employed with greater frequency in cases of injuries to the knee. This examination may be more enlightening than x-rays in some conditions. In ligamentous injuries it is of greater positive value than x-rays. In meniscus lesions, the displaced meniscus may be replaced while under this drug. Its greatest value is in the determination of ligamentous rupture. Among the important purposes accomplished are: (1) Relief from pain; (2) relaxation of muscles, by knocking out the watch dog action of the quadriceps.

Naturally, the surgeon will attempt to replace any displaced structures.

Joint Thermometry. Putti and Casuccio state that the determination of the local temperature of a joint is of value both in diagnosis and prognosis.

In a number of cases the deep temperature of the joints, measured with Zondek's deep thermometer, was found to be several degrees higher than the surface temperature.

In all acute diseases of the knee joint, tuberculosis, tumor, and juxta-articular osteomyelitis, there is a rise of temperature. In Putti's series of nontuberculous arthritis, the rise of temperature was less than in the tuberculous cases.

CLINICAL SIGNS OF KNEE DISORDERS

No one sign is pathognomonic of a specific disease or lesion. Only by the evaluation and integration of all the symptoms, signs and tests can a reasonably accurate diagnosis be made, first, in respect to the anatomic structures involved, and second, in determining whether it is an infectious, traumatic, mechanical or other type of lesion. There is no one test that "makes or breaks" the diagnosis, and there is no one test that always determines the exact localization of a lesion or injury.

The term "locking" is often used to describe difficult extension of the knee due to sprain, whereas it should mean an insurmountable wedging of the joint. Locking can occur from a nipped loose body pedunculated or otherwise, from blocking of a tibial spine, from a slipping of a hamstring over an osteoma, or from a slipping of biceps over the head of the fibula.

The value of the drawer sign has been seriously questioned because of its variability and uncertainty. Stability may be lost by atrophy due to locking, sprain or effusion. It will be particularly noticeable if the joint is fixed for a considerable period after the surgical treatment of some complication as when the joint has been tapped or has been operated upon. It may be overshadowed or obliterated by any kind of "locking" due to pinching. The articular surfaces then separate from each other, the ligaments become tense, and the muscular tone increases through the additional irritation caused by pinching. The drawer sign may lead to erroneous conclusions.

Internal Rotation of the Tibia. This maneuver was first demonstrated by Fouche. According to Dutoit and Enslin, the test is carried out on the right knee, with the patient flat on his back on a couch, with his hip and knee fully flexed. The left fingers of the examining surgeon are held on the anteromedial joint line, the right hand firmly grasping the patient's right foot, which is used as a lever in internally rotating the tibia on the femur. The motion is carried through as a complete circumduction movement, starting with the knee fully flexed, and ending with it slightly flexed. The menisci move with the tibia, and the posterior end of the medial meniscus is nipped between the femoral and tibial condyles, the tendency being for the femoral condyle to force the meniscus toward the center of the joint. It may move a small distance, and then slip back, producing an audible and palpable thud. With practice, one is able to recognize this normal thud, and to distinguish it from other sounds. The sound which may be elicited from a torn meniscus is a crunch or squelch; from a narrow bucket-handle strip of cartilage, a high-pitched click; or from multiple splits in the posterior part of the meniscus, a succession of clicks. A broad rim of meniscus which is partly loose may cause only exaggeration of the normal thud; while the reduction or the dislocation of a wide bucket-handle portion causes a loud crack and a jolt.

External Rotation of the Tibia. The maneuver for internal rotation of the tibia is reversed for the detection of lesions of the posterior half of the lateral meniscus. For this purpose it has been found to be of considerable value.

Manipulation of the Knee in 20 Degrees of Flexion. This maneuver is carried out with the patient's knee relaxed. The examiner puts one hand on either side of the joint, and circumducts the knee in a small circle, meanwhile holding his thumbs on the joint line on either side. By this method it is often possible to elicit thuds or clicks due to tears situated farther forward, near the anterior attachments of the menisci.

Crushing Sign (Apley). In testing for laxity of the collateral ligaments, pain may be elicited over a torn medial meniscus by adduction of the tibia on the femur as a result of crushing the torn tissue. Abduction may cause pain when the lateral meniscus is torn.

Roentgenographic Examination. This is a routine part of the clinical examination and is essential to accurate diagnosis.

Roentgen findings usually are negative. A negative film is contributory evidence of meniscus disturbance. In an uncomplicated case of medial meniscus disturbance, the roentgenogram should show nothing positive. A meniscus does not reveal itself in a roentgenogram unless it is ossified, calcified or visualized by injection of air, gas, or other opaque substance. It is frequently noticed that the space between the medial condyle of the femur and the medial tuberosity of the tibia is narrower than the corresponding space on the lateral side.

Lagegren reports his roentgenographic studies of the knee with the use of 20 cc. of a 17.5 per cent solution of perabrodil. With this opaque substance and by a simple technic, he was able to demonstrate meniscal injuries in clinically uncertain cases. It was possible also to make a diagnosis of the type and extent of the damage which was subsequently confirmed by the operative findings.

DIAGNOSIS

The diagnosis of knee lesions is made from the combination of a careful history and complete physical and roentgen ray examinations. One must differentiate between lesions caused by injury and preexisting conditions which are aggravated by injury.

At this point I wish to emphasize precision in diagnosis. I make a plea for immediate exact anatomic diagnosis in acute injuries of the knee. Early diagnosis will lead to early appropriate treatment which automatically minimizes disability. It is possible to observe clinical syndromes precisely, in localization and pathologic anatomy in knee lesions. Keen diagnostic ability is required. One must be willing to take the time to obtain an accurate and complete history and to make a meticulously careful examination. One must be proficient in the interpretation of routine and special roentgen ray projections.

A consideration of the history of injury, mechanism of injury, locking of the knee in flexion, pain, disability and a point of tenderness unexplained by roentgenograms made in three projections is essential. Important conditions to be considered are: (1) A loose body, such as found in osteochondritis dissecans or osteochondromatosis; (2) a traumatic synovitis; (3) traumatic arthritis; (4) injury to the crucial ligaments; (5) pinching of the synovial membrane.

DIFFERENTIAL DIAGNOSIS

An accurate differential diagnosis is imperative in order to institute appropriate treatment. It is necessary to know the cardinal symptoms and signs, and the characteristic physical and roentgen manifestations of all injuries, lesions, deformities and diseases that might affect the knee. Unlike causes may produce similar symptoms, physical manifestations, pathologic changes and roentgen appearances.

The most important conditions to be differentiated are injuries, infections, arthritis, neoplasms, synovitis and osteochondritis. Exact location of the lesion during the early stage demands skill and painstaking study. The structure affected must be differentiated, i.e., the bones, synovial membrane, menisci, ligaments, or bursae. Involvement of the ligaments is difficult to determine because of their close association anatomically and physiologically with other structures. No single sign or test is pathognomonic or infallible.

Consistent localized points of pain and tenderness, determined by palpation, are important. Too much reliance should not be placed on roentgenograms.

Important questions are: Is the evidence obtained from the history and the physical examination, as well as from the roentgenograms and other laboratory studies, compatible with a certain condition, even though not entirely conclusive? Is the roentgen evidence confirmatory or conformatory?

Trauma to the Knee. Injuries of the knee joint constitute an important problem in industrial surgery because of their frequency and the protracted periods of disability to which they often give rise.

One of the most important single aids to the diagnosis of injury to the knee joint is the history. *Do not be in a hurry to make the physical examination.* The history that precedes (or antedates) the episode in question is of vital importance. Many patients unwittingly mislead the doctor in regard to the degree and duration of pain. The patient's condition before the alleged trauma should be ascertained. The normal knee is resistant, but the predisposed knee is susceptible to various lesions. A person with intermittent attacks of disorders of the knee will try the surgeon's diagnostic ability. There should be a minute and exact account of the mechanism of injury and subsequent course.

The mechanics involved in every stage of the injury should be stated:

Was it a leverage mechanism?
Was it a direct blow?
Was it a concussion type?
Was it a compression injury?
Was it a contra-coup injury?
Was it a crushing injury?

A preexisting condition may be aggravated by a slight injury. The patient may have had the condition for a long time and a slight injury accentuates the pain and temporarily causes an increase of symptoms. Differentiation must be made between lesions caused by a specific injury and preexisting conditions which are aggravated by that injury.

Fractures or dislocations of the knee are diagnosed from the history, examination and roentgenograms. A fracture always has a history of injury even though the trauma may be slight. It usually causes localized pain. Roentgenograms reveal the fracture or dislocation.

Multiple injuries require careful analysis. It is not sufficient to diagnose a lesion which might cause the signs and symptoms under consideration; a complete examination is necessary even though pain and spasm may require an anesthetic to permit a careful study.

Injury to the Alar Pad of Fat. True locking is absent. Full extension is painful, but tenderness can be elicited by pressing on the pad, and the examiner gets the sensation of something slipping between the fingers. This structure is tender.

Rupture of the Tibial Collateral Ligament. Trauma usually produces an abduction rather than a rotary mechanism. There is no history of locking. There is tenderness usually over the tibial, but sometimes over the femoral attachment. Undue lateral mobility is demonstrable while the knee is extended or slightly flexed.

Rupture of the Cruciate Ligaments. In rupture of the anterior cruciate ligament, the tibia can be displaced forward on the femur, even though the knee is fully extended. In rupture of the posterior cruciate, the tibia can be displaced backward on the femur when the knee is flexed to a right angle. If these findings are present, a careful comparison should be made with the normal side, as many persons possess unduly mobile knees.

Fracture of the Patella without displacement can be diagnosed by a consideration of the points of tenderness on pressure, and by x-ray appearance.

Recurrent Dislocation of Patella. The quadriceps is lax, and when the knee is examined extended on the table, it is easy to push the patella over the outer femoral ridge.

Fracture of the Tibial Spine. The injury required is usually severe, and the mechanism of the strain is not a rotatory one. Sharply localized tenderness over the attachments of the semilunar cartilage is not present. Locking is present but assumes the form of a block to movement. The fracture usually is seen on roentgenographic examination, especially in the Holmblad projection.

Derangements of the Menisci. A typical history of injury with locking followed by joint effusion and joint tenderness directly over the medial meniscus is not always obtained. Locking is not a necessary symptom. "Bucket-handle" fracture is the most consistent cause of locking.

Adhesions. The formation of adhesions following an injury or tear about the attachments of the meniscus is common. It is not possible in any given case which presents signs of adhesions to exclude an injury to the meniscus which will subsequently recur and require operative attack, even when the adhesions have been satisfactorily dealt with by forcible manipulation.

Slipping tendon may give rise to symptoms of locking, but the lock is momentary and is easily reduced by the patient himself. No joint effusion follows, and the tenderness over the joint line is absent. The roentgenogram may show the exostosis over which the tendon slips.

Traumatic neurosis is a diagnosis easily made but hard to prove. Malingering may be suspected from the general behavior of the patient. It is wise to approach the history from various angles. One cannot convince a third person that a man is a malingerer unless that person himself believes it. By the "relocation test" one finds that previously marked areas cannot be relocated with reasonable accuracy. Usually the gait and the attitudes on rising and sitting are normal. One should watch the patient undress, especially when he removes his shoes and hose. Involuntary muscle spasm is not seen in malingerers. Actual traumatic areas usually are diffuse, with widely spaced normal areas. Exaggeration, which means magnification of a real condition, always creates a difficult situation.

Hysteria reveals a disproportion between the subjective symptoms and the clinical observations. Other stigmas of neurosis are usually observed. There is more pain but less rigidity, except voluntary muscle spasm. Normal roentgenograms assist in making a diagnosis.

Infectious Disorders. Tuberculosis. Differential diagnosis between tuberculosis and arthritis may be difficult. Tuberculosis shows little tendency toward regeneration of bone, a striking feature in cases of arthritis. Tuberculosis causes rigidity from voluntary muscular spasm, pain, and bone destruction.

Pyogenic osteomyelitis of the knee is indicated by a history of a preceding infection, the acute febrile state and the early destruction of bone. Lesions of the bones which also must be borne in mind are those due to syphilis, or other diseases. Syphilis may be ruled out by serologic tests or by response to specific therapy.

Arthritis. Hypertropic or degenerative arthritis is evidence of wear and tear on the knee joint. Typical joint changes, with spur formation, occur, due to untreated or neglected joint disorders. They are nonarticular. Both knees are involved as part of a generalized osteoarthritis, which manifests itself in one or both joints due to increase in weight, postural defects, or other situations which result in abnormal mechanics or overuse. An advanced degree of arthritis may be present for years and not manifest itself until one of these precipitants enters the picture.

Arthritis may be recognized from the history, physical findings, and roentgen examination. The disease causes pain, rigidity, and sensitiveness to movement. There is no deformity until the condition is advanced, when the deformity is generally of the valgus type. Roentgenograms in lateral projection may show thinning of the cartilage and some narrowing of the joint space with "lipping" of bone at the articular surface and bridging of bone. Anteroposterior views reveal lipping, with spurs.

Synovitis may be due to overuse. This is followed by muscular weakness and a feeling of insecurity. The patient may state that the joint gives way, feels weak, particularly on going downstairs or downhill. There is not very much to be made out on examination, except quadriceps insufficiency and some coarse grating. Forced extension may give rise to pain.

One must consider the differential diagnosis of a mild arthritis from an internal derangement and from tuberculosis.

Neoplasms. Benign osteomas, giant cell tumors, and several other tumors occur in the region of the knee.

Osteomas may be multiple. The history shows that the tumor has been present for a long time and that its growth is slow. There is often no pain unless the osteoma interferes with other structures. The roentgenograms show that the structure of the tumor resembles that of normal bone.

Malignant new growths are not frequently seen in and about the knee. They cause persistent pain that is not relieved by recumbency. Rigidity from involuntary muscle spasm is present. Deformity does not occur until there has been considerable destruction of bone.

Carcinoma. In cases of carcinoma, there is usually a history of a primary focus in a breast, prostate, thyroid, kidney, adrenal gland or gastrointestinal tract. The roentgenograms will show absorption of the bone calcium and obliteration of the detail structure of the bone, suggesting that it is being gradually dissolved. As a rule, there is no evidence of new bone formation.

Sarcoma usually produces a large swelling which develops rapidly. In some cases, the bone is eroded, but the erosion is not confined to the same parts of the bone, as is commonly the situation in tuberculosis. The osteoplastic type of sarcoma shows an increase in the density of the involved bones. The diagnosis is made on the basis of roentgenograms which disclose the characteristic bone changes of this disease in certain other locations of the body, i.e., irregular hypertrophy and rarefaction with linear striations.

Nutritional and Metabolic Disorders. Rickets occurs during dentition. It should be easily differentiated from tuberculosis, which is rare before the age of 2 years. Rickets may cause pain. It usually produces knock-knees or bowlegs. When the tibia is curved, the thickening of the cortex is on the concave side, whereas in syphilis it is on the convex side. Other evidences of rickets include the "rachitic rosary," square head, irregular and broad epiphyses, "potbelly," Harrison's groove, coxa vara and altered calcium and phosphorus levels in the blood.

Osteomalacia. In the osteomalacias, especially the hunger type, which was frequently observed in Germany shortly after World War I, there is softening of the bones of the knee with bending.

In *acute cases*, roentgenograms usually show only capsular distention, with a floating *patella. Narrowing of the joint space on* the side of the deranged cartilage as seen in the anteroposterior exposure has not been a common finding. Sprain of the internal collateral ligament of the knee is to be differentiated by location of the maximum pain and tenderness about 1 inch above the level of the cartilage over the medial condyle of the femur. The lateral meniscus derangement is diagnosed with difficulty. Tenderness over the cartilage is usually misleading.

Miscellaneous Conditions. The following conditions may cause similar symptoms: loose body; quadriceps insufficiency; enlarged or injured retropatellar fat pad; ruptured lateral ligament; injury to the anterior crucial ligament; adhesions; slipping tendon; joint disease (arthritis); intraarticular fracture; fractured patella, and recurrent dislocation of the patella.

Quadriceps Insufficiency. The weak wobbly knee which gives way, which is the subject of recurrent attacks of synovitis, which is weak and untrustworthy—such weakness being particularly noticeable on going downstairs—is often ascribed to a damaged cartilage. Without a definite history of locking, and locking which requires manipulative interference, the diagnosis of a meniscus disorder should not be made when the quadriceps is wasted and lacking in tone. Such a patient should be treated for muscle insufficiency. If there be a recurrence of the symptoms, with the muscles in good condition, internal derangement is suspected.

THE MENISCI

The menisci are compressible to normal mechanics, but fragile and friable to abnormal mechanical forces. Menisci crack like glass. I have cracked them often experimentally during operations, where I could clearly obser [illegible] menon.

According to Palmer, the menisci, while retaining their resiliency, may be compressed from 5 to 2½ mm. in thickness.

Functions Attributed to Menisci by Various Writers. (1) Deepen "joint socket." (2) Improve the "fit" of bones compensating for incongruity of ends of bones. (3) Movable wedges. (4) Mobile lips of joint. (5) Shock absorbers. (6) Compressible wedges. (7) Ball bearings to facilitate rotatory movements. (8) "Brake shoes" against abnormal excursion of bones. (9) "Wagon chock" preventing undue forward gliding. (10) Equalizers of intraarticular pressure. (11) Cushions to minimize concussion of joint. (12) Stimulators of lubrication of joint by their movement. (13) Improvers of resiliency of joint. (14) Increase gracefulness of gait. (15) Springs that store energy for release when pressure is removed. (16) Increase elasticity of gait by resilient rebound. (17) Protectors of peripheral joint structures by their sliding action. (18) Protectors of the hyaline cartilage of joint surfaces. (19) Prevent friction in joint. (20) Defenders against arthritis.

Meniscus disturbances include posterior horn lesions; lateral meniscus lesions; cysts of lateral meniscus; discoid meniscus; dual lesions; calcification of meniscus; ossification of meniscus; hypermobility of meniscus; tumors of menisci; Smith-King syndrome.

History. A clear and accurate history is essential. It is equal in importance to any part of the physical examination. It is often more important than the x-rays. The question of previous accidents to the knee must be carefully noted. The exact sequence of events when the accident happened should be obtained: Did something in the knee give way and so cause the patient to fall? Or did some external force or slip cause the fall? If the former, an internal derangement is most likely. The question of locking, the degree of swelling and the rapidity of its onset are important points.

Symptoms. The usual history of symptoms is as follows: The patient sustains a sudden twist of the knee associated with pain in the joint. It may cause him to fall to the ground. On arising he finds he is unable to extend the joint completely and attempts to move the joint cause pain. In a typical case, the "locking" persists until the cartilage is reduced by manipulation or surgery. Effusion into the joint usually appears within a few hours. The pain is situated over the anterior end of the meniscus and frequently also over the medial border of the tibia. In posterior horn injuries, the pain is more marked on the posterior aspect of the joint.

Diagnosis. The first point in diagnosis is to determine if a meniscus lesion is present. If positive, the second consideration is a decision on which cartilage is affected. The differential diagnosis between a rotation strain of the knee and a cartilage injury may be very difficult in certain cases. When Bristow could differentiate between strain and cartilage injury, he advised gymnastics. If it were strain, gymnastics would cure it; if a cartilage injury, it would aggravate the symptoms.

The point of tenderness of the primary injury and early recurrence is of great importance in the differentiation between lateral and medial semilunar cartilages. It is impossible in some cases to make a positive diagnosis, and exploratory arthrotomy is necessary.

In many cases, an excellent tentative diagnosis can be made from the history alone.

Frequency of Meniscal Injuries:

1. Fracture-dislocation.
2. Dislocation without fracture.
3. Fracture without dislocation.
4. Erosions—irregularities of the cartilage surface usually encountered in the later stages of the knee joint osteoarthritis.

The tibial collateral ligament has been regarded as a key structure viewed from the standpoint of function. Its intimate relationship and connection with the medial meniscus is generally accepted as the reason why this meniscus is damaged so much more frequently than the lateral.

In expert hands the diagnosis of true hypermobility of the cartilage is permissible.

Examination. It is wise to follow some routine, or important points may be overlooked.

The *Lewin test* for internal derangement of the knee: While standing, the patient is instructed to perform the test on the unaffected leg first. He is told to maintain his heel and toes on the floor and then to flex and extend his knee forcibly. This should be carried out perfectly on the unaffected side. He is then asked to repeat the same movements with the affected leg when it will be seen that the extension is incomplete and the knee springs back to the flexion position. This movement may or may not be accompanied by pain. This should be done actively and passively.

The *McMurray test* is of great value in those injuries to the cartilage where the lesion involves the meniscus at, or behind, the middle of the joint. When the test is correctly applied, not only can the presence of a lesion be determined but its site can be mapped out with comparative certainty.

In making the examination the patient must be recumbent and relaxed; the surgeon standing on the side of the injured limb grasps the foot firmly, while the knee is flexed, until the heel approaches or touches the buttock. The foot is now rotated externally, and the leg abducted at the knee. Holding the leg and foot at this angle, the knee is slowly extended. With the alteration of the angle of the joint any loose portion of the medial meniscus is caught between the articular surface of the femur and tibia, and the sliding of the femur over the abnormal portion of the meniscus is accompanied by an appreciable click and pain.

The examination should be completed by a similar extension of the knee from full flexion, while the foot is rotated inwards and the leg abducted. If a click is produced it is possible to determine, from its severity and the angle of the joint at the time of its occurrence, the size of the broken portion of the meniscus and its location.

If the patient is particularly nervous, I employ intravenous pentothal sodium anesthesia. My experience with the McMurray maneuver has been very favorable diagnostically and therapeutically.

Treatment. Conservative measures, as a rule, are of only temporary value if the derangement continues to recur. Rarely, symptoms may eventually be relieved if the defect in the meniscus heals or the displaced fragment is absorbed; on the other hand, the joint may be irreparably damaged if surgical removal is delayed.

If the medical profession could be taught to place under proper surgical care patients with internal derangements of the knee, before they develop relaxation of the muscles, it would be a great step forward.

Treatment consists in immediate reduction of the displacement, if possible by manipulation followed by the application of a retentive bandage or a plaster cast. As a rule, weight bearing with the aid of crutches, with the knee in the extended position, is not harmful. If repeated dislocations occur, the indications are to remove the meniscus. This can be done by a simple operation, although technic and asepsis must be perfect because of the danger that an infection may occur and a stiff knee result. Some writers advocate removal only of the injured portion of the meniscus.

Operative Treatment for Meniscus Lesions. Local anesthesia is preferable to spinal or general anesthesia. A thorough study of the patient should be carried out before the operation. Complete hemostasis should be obtained. No knee joint should be closed without a visual inspection of the patellofemoral articulating surfaces to determine the presence or absence of chondromalacia.

Bristow advised a simple incision, avoiding the patellar branch of the saphenous nerve. The synovial membrane is opened above the medial cartilage and the joint inspected. If the cartilage is torn and the central portion displaced, the displaced part and the peripheral portion are removed as far back as convenient. If the joint appears normal, the anterior portion is freed and pulled forward to determine whether the posterior portion is torn. This procedure is important as it would be difficult to recognize a posterior tear otherwise. If the posterior half is normal, the detached anterior portion is removed and the posterior part left. The next step is exploration of the lateral portion to determine whether the lesion is a tear of the lateral meniscus.

A tourniquet is of great advantage. A pneumatic tourniquet is advised where the amount of constriction can be accurately determined. West maintains that the meniscus must be removed whether the split can be seen or not, and that localized tears or detachments of the posterior horn cannot be seen until removal of the cartilage is almost complete. "Large compression dressings of either absorbent cotton or sheet wadding are applied with resilient bandages as reinforcement, extending from the ankle to the groin. The tourniquet may be removed upon closure of the synovial membrane in order to obtain complete hemostasis."

In the *Campbell* technic the skin and superficial fascia are incised, beginning 1 inch medial to the middle of the patella and passing downward and parallel with the lower half of the patella and patellar tendon a distance of 2 inches, thence curving posteriorly for 1 or 2 inches. That there may be less danger of communication with the skin of the knee joint after closure, an incision is then made through the deep fascia and capsule ½ inch medial to the skin incision. At the proximal end of the wound the synovial membrane is grasped by two small hemostats, one of which is held by the operator and the other by an assistant; while traction is maintained on these instruments, a small opening is made into the joint with a scalpel. If there is irritation within the joint, fluid will escape immediately. The openings in the capsule and synovial membrane are enlarged with scissors to the size of the skin incision and all excess fluid is gently sponged from the joint. The medial cartilage is examined to determine the nature of the defect.

Cave and Bosworth each described a double capsule incision with a single skin incision.

The first step consists of an oblique incision slanting upward and slightly backward over the anterolateral or anteromedial aspects of the joint, depending upon which meniscus is to be removed. Such an incision will avoid injury to the patellar branch of the saphenous nerve since it parallels the course of this nerve. The skin and subcutaneous tissue can be drawn forward and the capsule opened at the usual point anteriorly, in line with its fibers, by a vertical incision. The synovium above the meniscus should be opened between two pairs of forceps, care being taken not to mark or to cut the articular surface of the underlying femoral condyle. The small synovial pouch below the meniscus, between it and the tibia, should be opened in similar fashion. By means of curved scissors, one blade of which is placed above and the other below the meniscus, the anterior end of the meniscus can be freed from the synovium and the coronary ligament. In like manner, the base of the meniscus can be dissected free from its attachment to the collateral ligament. The knee is then flexed and the skin and subcutaneous tissue are dissected backward from the collateral ligament close to the capsule of the joint. The capsule is opened over the posterolateral margin of the femoral condyle behind the collateral ligament by a vertical incision in line with its fibers. The anterior portion of the meniscus is then passed backward under the collateral ligament, and its posterior third can be well visualized extending into the back of the joint. The posterior third is freed from its attachment with scissors as far back as the posterior tibial spine. If a good view of the extreme posterior tip cannot be obtained, it can be divided by a tonsil snare, thus avoiding any danger of laceration of the posterior crucial ligament.

When the knee is straightened, the posterior incision will be found to close tightly, usually without sutures. The anterior incision is closed with interrupted fine silk sutures, care being taken to draw the subpatellar fat pad out of the joint by including a portion of it in the suture. The skin and subcutaneous tissue are closed with interrupted silk, and a dressing wrung out of Dakin's solution is applied with a pressure bandage. The pressure bandage is cut two hours later and the knee is rebandaged.

Postoperative Management. The snug bandage is left in situ for 24 hours, and is then cut through without disturbing the underlying dressing.

The patient is encouraged to move the leg in bed, and to contract the muscles voluntarily. At the end of 48 hours he should be able to raise the limb from the bed, to tighten and relax the quadriceps on the sixth day or earlier; on the eighth day the sutures are removed.

The patient should be up and walking on the tenth day. His early efforts at walking are supervised by the masseuse in order to teach him to take an equal length of stride with each foot and to bear his weight symmetrically.

Common Causes of Operation Failure. Incorrect diagnosis; incomplete diagnosis; wrong structure operated upon; pathologic changes in structures not visualized at operation; pathologic changes not recognized at operation; incorrect "timing" of operation; incorrect postoperative care; postoperative complications (infection, thrombophlebitis, thrombosis, psychoneurosis); psychoneurosis; compensation factors.

In manipulation: don't add insult to injury; "easy does it"; use an anesthetic; don't brutalize an injured knee.

Prognosis. The prognosis of meniscal injuries is very favorable. The results following meniscectomy are among the best in the whole field of bone and joint surgery, although persistent pain, effusion or limitation of movement are occasionally encountered.

The best results are obtained in young adults when the offending meniscus is removed within a short time after the injury is sustained.

FAT PAD

Hoffa's Lesion: Lipoma Arborescens. In 1903 Hoffa studied a case of striking hypertrophy of the adipose tissue located beneath the patellar ligament. In 1904 he reported 7 similar cases, in each of which an operation was performed. The syndrome, however, was described by Annandale in 1887 and Allingham in 1889

Fatty bodies may develop in the synovial fringes, producing lipoma arborescens.

Diamant-Berger and Sicard reported 3 cases, in the first of which there were two distinct lesions a benign prepatellar hygroma which was present before the trauma; and hyperplasia of the infrapatellar fat pad which was related to the trauma and caused pain The second was a case of volvulus of the pedicle of an intraarticular lipoma of the knee, and third, a case of an arborescent lipoma which developed in the course of a post-traumatic chronic arthritis and was treated by synovectomy. They believe that the condition can be explained on the basis of post-traumatic hyperemia.

They divide the cases into those localized in the infrapatellar fat pad as Hoffa's disease, or in a synovial fringe called a solitary lipoma or form a generalized arborescent lipoma. Hoffa's lesion may be a sequel of traumatic arthritis of the knee. The arborescent lipomas have been thought to be of spontaneous origin; tuberculosis has been found in some.

It is probably caused by trauma producing hemorrhage into the plicae alares and a gradual transformation into chronic hyperplasia of the synovial membrane. Hydrops is superimposed and ultimately pain develops from pinching of tissues.

Contusions of the Fat Pad. Contusion or bruising of this structure is a definite traumatic entity and is caused usually by a direct blow on this area of the joint. At other times it is a complication of ligamentous injuries. The diagnosis is made by the swelling and tenderness just below the patella and to either side of its tendon. There is usually a feeling of fullness at this site and pain on full extension of the knee but there is no definite locking or blocking of the joint as seen in the cartilage and tibial spine cases. At times the symptoms do not come on immediately following the trauma but gradually increase for twenty-four or forty-eight hours. In the most acute cases aspiration, if effusion is present, and rest in a plaster cast with the knee flexed to about 20 degrees for at least two weeks is indicated. This should be followed by a compression bandage and an elevation of the heel of the shoe on the affected side for an additional two or three weeks. In the milder cases, the latter part of this treatment is all that is needed.

Diagnosis. In Hoffa's disease, according to Mercer, the pad is usually enlarged, and the swellings on either side of the ligamentum patellae are tender. This tenderness persists or is more pronounced when the joint is fully extended. This is a characteristic sign. The quadriceps may show a degree of atrophy.

When the knee joint is extended, the patella is drawn up by the contracting quadriceps, and the infrapatellar pad of fat is similarly pulled up to avoid being caught between the tibia and the femur. But when an excess of fat has been deposited in the pad, or when the quadriceps loses its tone, it may not be sufficiently drawn up, and is then liable to be nipped between the opposing articular surfaces. Repeated trauma of this nature is associated with hemorrhage into the pad, and further thickening; it becomes hard, and may project beyond the margins of the patellar ligament in the form of two small swellings each about the size of a walnut. This form of enlargement is most common in young athletes.

In older subjects, the infrapatellar pad may be hypertrophied or associated with intraarticular arthritic changes, as for example, villous hypertrophy of the synovial membrane.

The symptoms are those of chronic intractable, recurrent hydrarthrosis.

The knee is painful, and the pain is situated just behind the infrapatellar ligament. Motion is restricted and the patient may complain that the knee is weak and liable to recurrent attacks of swelling. These complaints are more marked after exercise or following prolonged use.

True locking does not occur, but at intervals the joint may appear to "give way" or a sharp stabbing pain may occur which temporarily limits the patient's physical activity.

Progressive limitation of extension results from interposition of the hypertrophied fat pad between the articular surfaces. This makes the patient walk with his knee partially flexed, bearing his weight on the metatarsophalangeal joints with the foot in the equinus position.

Examination reveals hypertrophy of the fatty ligament producing a painful swelling on both sides of the patellar tendon, which may be exaggerated when the patient stands; absence of bony changes around the joint; painful limitation of extension with normal flexion; atrophy of the quadriceps; and sometimes the presence of a roentgen shadow.

Radiologic examination is usually negative; occasionally, however, calcium salts are deposited in the hypertrophied fat and may cause a shadow in the location of the pad.

Treatment. Jones recommends the simple but effective device of raising the heel of the shoe on the affected side; this prevents full extension, and may be followed by subsidence of the swelling and disappearance of the symptoms. In severer cases, further measures may be required; in this connection, a hinged knee cage, so arranged that extension is arrested some 20 to 30 degrees short of full extension, may prove of service.

Conservative measures should always be supplemented by exercises, massage, and faradism, to strengthen the wasted quadriceps.

If conservative methods prove ineffective, the pad should be removed.

An incision is made to the medial side of the lower part of the patella; the pad is exposed and removed by a pair of curved scissors. In many cases more adequate exposure is needed.

The joint is approached through a longitudinal incision on the anteromedial aspect of the knee. A careful search is made for other derangements of the joint. If none are found, attention is given to the villi or fat pads. If symptoms have only recently appeared, there should be evidence of hemorrhage or marked congestion of the affected villi or pads; otherwise, there should be more or less fibrosis from subsequent injuries. The enlarged mass is caught by rat-tooth forceps and excised with curved scissors as near its base as possible. One or two blood vessels must be tied. The defect, if large, is covered by synovial membrane.

A posterior gutter splint is applied and is worn for a few days. Walking is permitted on the tenth day.

Surgical Repair of Fresh Posterior Lipping Fractures of the Tibia*

CARLO SCUDERI, M.D., F.A.C.S., F.I.C.S., AND
EDWARD L. SCHREY, M.D.
CHICAGO, ILLINOIS

IN recent years, both in private practice and on the Fracture Service at Cook County Hospital, posterior lipping fractures of the tibia involving a posterior dislocation of the astragalus with an upward and posterior displacement of the posterior lip of the tibia have been seen with increasing frequency. Until 1942 the senior author had attempted to repair this type of fracture by various methods of double pin fixation using the Boehler apparatus and innumerable technics of plaster cast application The follow-up of cases treated by this method revealed a very high incidence of traumatic arthritis with destruction of the cartilaginous surfaces of the astragalus and tibia and subsequent painful weight-bearing joints that later required an ankle fusion.

Observing the unhappy end results of the treatment formerly employed led one of the authors, in 1942, to begin the internal fixation and accurate reapposition of all of these types of fractures, as soon as the diagnosis was made.

Only by early recognition of the pathology and early operative intervention was it possible to secure an accurate reapposition of these fractures. With the proper equipment an experienced operator is able to obtain an anatomic hair-line reduction of the posterior lipping fracture, so that on the x-ray film it is impossible to detect any irregularity of the weight-bearing surface of the tibia.

It is not the purpose of this paper to discuss the treatment of old posterior lipping fractures with osteoarthritic changes, as it is a well recognized fact that the only solution to this problem is an ankle arthrodesis. We are interested only in discussing the treatment of fresh posterior lipping fracture.

ETIOLOGY

Fractures of the posterior lip of the tibia rarely occur without an associated fracture of the internal and external malleoli. For this reason this type of fracture has been called trimalleolar fracture. Cotton of Boston was probably one of the first men to call our attention to this particular type of fracture and therefore many men recognized this fracture by the name of the "Cotton Fracture".

Occasionally one sees an isolated fracture of the posterior lip of the tibia without fractures of the internal or external malleoli, but this is indeed a rarity. This is possible only when there is an associated tearing of all the ligaments about the external or internal malleoli, as well as those of the tibioastragaloid articulation. When these conditions are present they permit the ankle to dislocate posteriorly and carry off the posterior lip of the tibia.

In order to produce this fracture it is necessary that violence be thrown on the long axis of the leg with the foot in the equinus position. A very common cause of this type of injury is to trip while going down the stairs, catching the heel and throwing the person forward, thus producing a trimalleolar fracture. In view of the fact that it is the present vogue for women to wear high heels, this type of fracture occurs far more frequently in women than in men. It is practically impossible to produce a posterior lipping fracture with the foot and ankle in the flexed position. Usually, when violence occurs to the ankle with the foot in this position, an anterior lipping fracture or a vertical compression fracture of the tibia is produced. It is not the purpose of this paper to discuss this rather uncommon type of ankle fracture.

Posterior marginal fractures of the tibia are sustained in one of the two following ways:

1. They may be the result of external rotational injury of the ankle joint in which a torsional strain produces a s [illegible] the extern [illegible] lleolus, the frac

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* From the Fracture Service, Cook Count
Chicago

upward and outward from the tibiofibular joint. When the force continues, the fracture of the fibular malleolus is associated with an avulsion fracture of the tibial malleolus or a rupture of the internal ligament with an outward dislocation of the foot. With the force continuing and the foot in the equinus position there is produced a posterior marginal fracture of the tibia with a posterior dislocation of the astragalus and the fractured segment of the tibia (Fig. 1, 1, 2, 3).

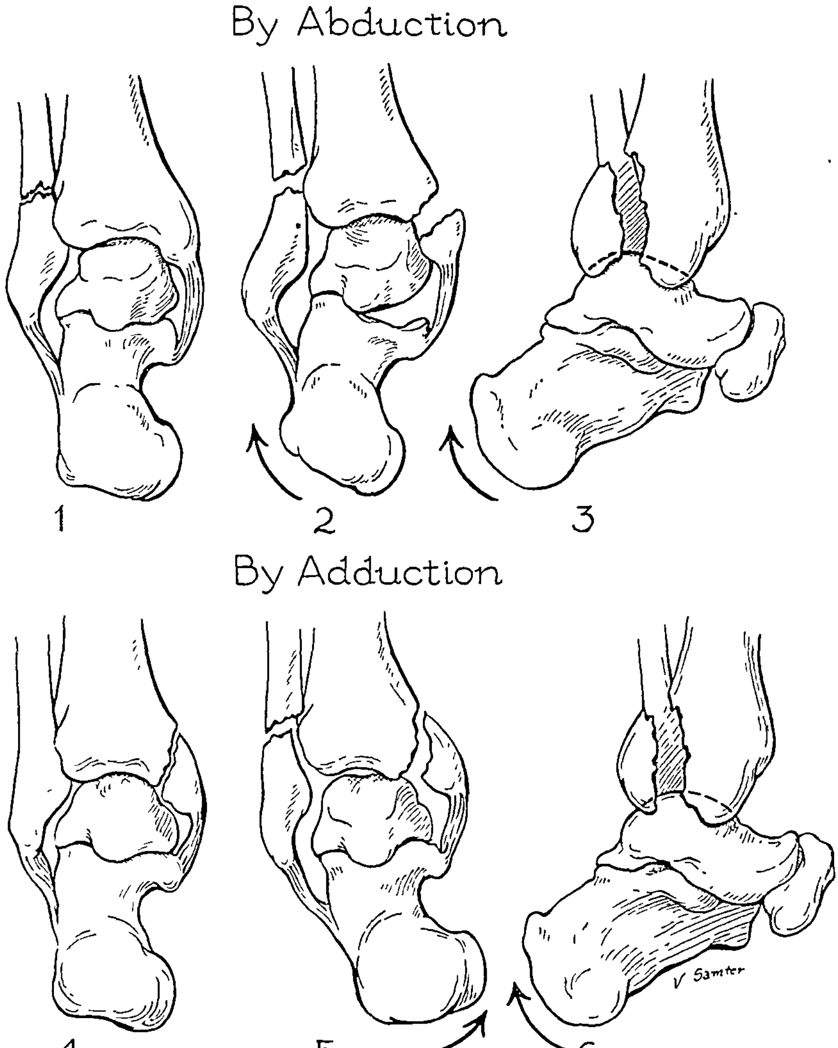


Fig. 1. These illustrations show the various steps in the production of posterior lipping fracture by the mechanism of abduction and adduction. 1, *Fracturing of the external malleolus by abduction*; 2, *avulsion fracture* of internal malleolus; 3, posterior dislocation of the astragalus taking place as the result of the fracturing and separation of the posterior lip of the tibia; 4, fracturing of the internal by adduction; 5, fracturing of the external malleolus by the continuation of the force into adduction; 6, final stage in the pathology, the fractured posterior lip of the tibia with posterior dislocation of the astragalus.

2. The same type of fracture may be produced by an adduction injury to the foot and ankle where the foot is forcefully inverted and the astragalus has been driven inward and upward against the mortice of the articular surface of the tibia and fractures the internal malleolus at its base. As the force

continues the lateral malleolus is avulsed at or near its tip and as it continues, the posterior marginal fracture of the tibia occurs, with backward dislocation of the astragalus on the foot (Fig. 1, 4, 5, 6).

As previously stated, only in very rare cases is it possible to obtain a pure posterior dislocation of the foot with a fracture of the posterior lip of the tibia but without associated fractures of both the internal and external malleoli. This is possible only when the violence has no opportunity of adduction or abduction of the foot, but is a pure posterior violence usually produced when the foot is held in a fixed position and the body weight is thrown forward with a great deal of violence, so that the only active force involved is forward displacement of the tibia.

PATHOLOGY

The pathology of fractures of the external and internal malleoli is well known by everyone who has had any experience in traumatology. The internal malleolus is notorious for its high incidence of nonunion owing to the fact that all too frequently a flap of periosteum drops between the fragments and union is prevented because of soft tissue interposition. In our experience the incidence of nonunion from simple fracture of the internal malleolus has been approximating 35 per cent.

Fractures of the external malleolus present no real problem and we have never seen nonunion in this region. Apparently, vascularity of the bones and the fact that reapposition is so easily obtained accounts for the high incidence of union. Neither capsular nor periosteal interposition has ever been observed by us in this type of fracture.

It is somewhat difficult to see the pathology of posterior lipping fracture per se unless one has had the opportunity of operating on a considerable number of these cases and observing them from the posterior approach. By no form of anterior, medial, or lateral incision is it possible to see the actual pathology and to be able to replace the fragments to their normal position. The posterior approach is the only method in which clear vision can be obtained. Occasionally, small fragments of bone break off and prevent the accurate reapposition of the posterior lip of the tibia to the main fragment. In such instances the fragments must be removed. We have never observed soft tissue interposition in this area. Hematoma formation occurs quite quickly and the resulting fibrous tissue becomes quite solidified in a relatively short period of time, so that unless the case is operated on within the first week or 10 days accurate reapposition of this fragment becomes practically impossible In addition, the contractures of the soft tissues, especially the Achilles tendon makes the accurate reduction of the posterior dislocation of the foot quite difficult. For this additional reason it is also important that reduction be obtained early before soft tissue contractures occur.

SYMPTOMS AND SIGNS

The appearance of the foot and ankle following a posterior lipping fracture is very characteristic. The diagnosis can be made very accurately without x-ray films if one bears in mind these important points:

1. There is an increased arching of the normal curvature of the Achilles tendon as it runs into the os calcis. It becomes almost semicircular in its configuration.
2. There is a definite visible protrusion of bone at the ankle, this being the anterior surface of the tibia which now finds itself subcutaneous and about one inch anterior to the weight-bearing portion of the astragalus that formerly was in a juxtaposition with the tibia.
3. In addition, there is a widening of the ankle joint in all cases, due to a combination of edema, hemorrhage, and displacement of the internal and external malleoli. After 48 to 72 hours there is an associated ecchymosis of the surrounding area frequently extending to the upper portion of the calf, with associated edema. The points of exquisite tenderness in a trimalleolar fracture are primarily over the external and internal malleoli. Due to the displacement of the posterior lip and lack of bone contact with the main fragment of the tibia pressure in the mediolateral aspect of the Achilles tendon is not usually associated with much discomfort to the patient.

If the patient is cooperative and willing to tolerate some additional pain it is surprising to notice that the patient is able to extend the foot quite well, but has a complete loss of flexion. This is due to the mechanical disadvantage at which the ankle finds itself once a posterior dislocation has occurred.

DIAGNOSIS

The diagnosis of a posterior lipping fracture can be made quite accurately from the history and physical findings. An individual who trips while going downstairs, stepping off a curb, or alighting from a bus with the ankle in the equinus position followed by a fall and associated with severe pain and discomfort of the ankle is a candidate for a posterior lipping fracture of the tibia. Immediately after the fall there is a resulting deformity of the foot and ankle with the three prominent factors, as mentioned above under symptoms and signs, that aid in the diagnosis and can be considered almost pathognomonic for posterior lipping fractures of the tibia. Needless to say, x-ray films are always used for confirmation and to determine the extent of the fractures.

PROGNOSIS

The ultimate outcome of this type of fracture naturally depends on the severity of the injury and the accuracy with which the reduction has been performed.

The accurate surgical reduction of this fracture decreases the complications almost to the disappearing point. Posttraumatic arthritis of the tibioastragaloid joint does not occur if the reduction has been done accurately. The limitation of motion of the foot and ankle is minimal if the internal fixation has been well placed and early active motion of the foot and ankle is performed. It has been our experience that no weight bearing should be permitted on this type of fracture under 4 to 4½ months from the date of the operative intervention, otherwise there is grave danger of displacing the posterior fragment and getting a recurrence of the posterior dislocation of the astragalus. Obviously, either one of these complications constitutes a complete failure.

In cases that have been seen late or that have not been accurately reduced the incidence of joint changes with progressive osteoarthritis and a painful weight bearing joint occurs in all cases of this type. The best solution to this problem is an arthrodesis of the ankle. Anyone of the numerous types of arthrodesis is satisfactory, depending, of course, on the experience of the surgeon and the pathology that is present at the time the operation is being performed.

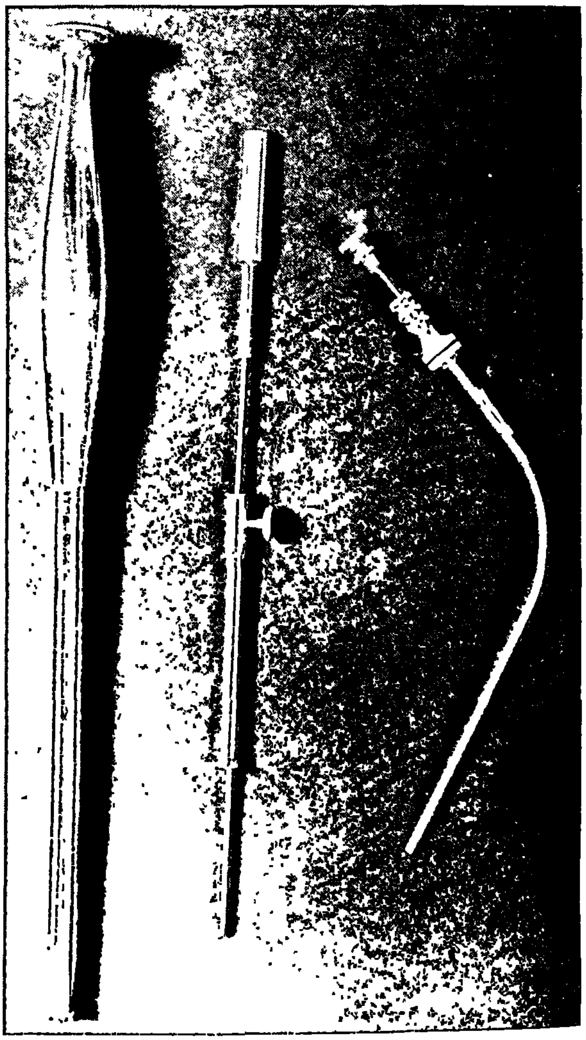


Fig. 2. From left to right Schrey pressure bar—Jackson depth gauge—Frazier aspirator. These three instruments greatly facilitate the surgical repair of this type of fracture.

TREATMENT

As stated previously, it is our firm conviction that posterior lipping fractures should be operated on as soon as the diagnosis is made and the patient's general physical condition permits. Only by early intervention is one able to reappose accurately the fragments, see the dentations of the fragments so that they can be fitted anatomically, and prevent the soft tissue contractures and the spasm of the gastrocnemius with posterior upward displacement of the astragalus.

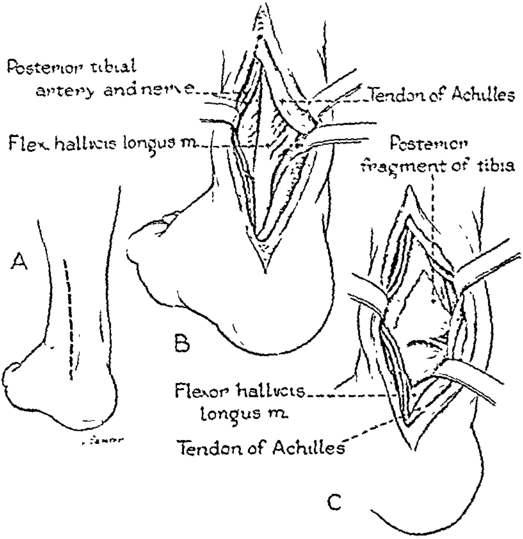

Posterior tibial artery and nerve
Tendon of Achilles
Flex. hallucis longus m.
Posterior fragment of tibia
A
B
Flexor hallucis longus m.
Tendon of Achilles
C

Fig. 3. A, Line of incision just medial to the medial border of the tendon of Achilles. B, The tendon of Achilles is retracted laterally and the posterior tibial artery and nerve are retracted medially, exposing the tendon and part of the muscle belly of the flexor hallucis longus muscle. C, With the flexor hallucis longus muscle and tendon retracted laterally, the fracture of the posterior lip of the tibia can be easily seen.

Over the last six years it has been our observation that at operation there are three fundamental requisites necessary in order to deal with this fracture with some degree of finesse:

First and foremost is the position on the operating table. The patient must be placed in a prone position with the feet just over the end of the operating table, so that the foot can be pushed anteriorly and acutely flexed without any interference, so that at the time of the operation it may be brought to a right angle with the leg

Next, and of no less importance, is the unobstructed field of vision. This is obtained by an adequate incision and the avoidance of continuous oozing in this richly vascular field by the use of a Martin constrictor. It might be well to interject at this point that a poorly applied constrictor is worse than no constrictor at all. To attempt operation on posterior lipping fractures without a constrictor is like trying to find a golf ball at the bottom of a muddy creek. Complete visibility is essential. Complete dryness in the field can be obtained by the use of a neurosurgical aspirator, either of the Frazier or Adson type, thus obviating the necessity of frequent and time-consuming sponging with coarse gauze dressings on instruments (Fig. 2).

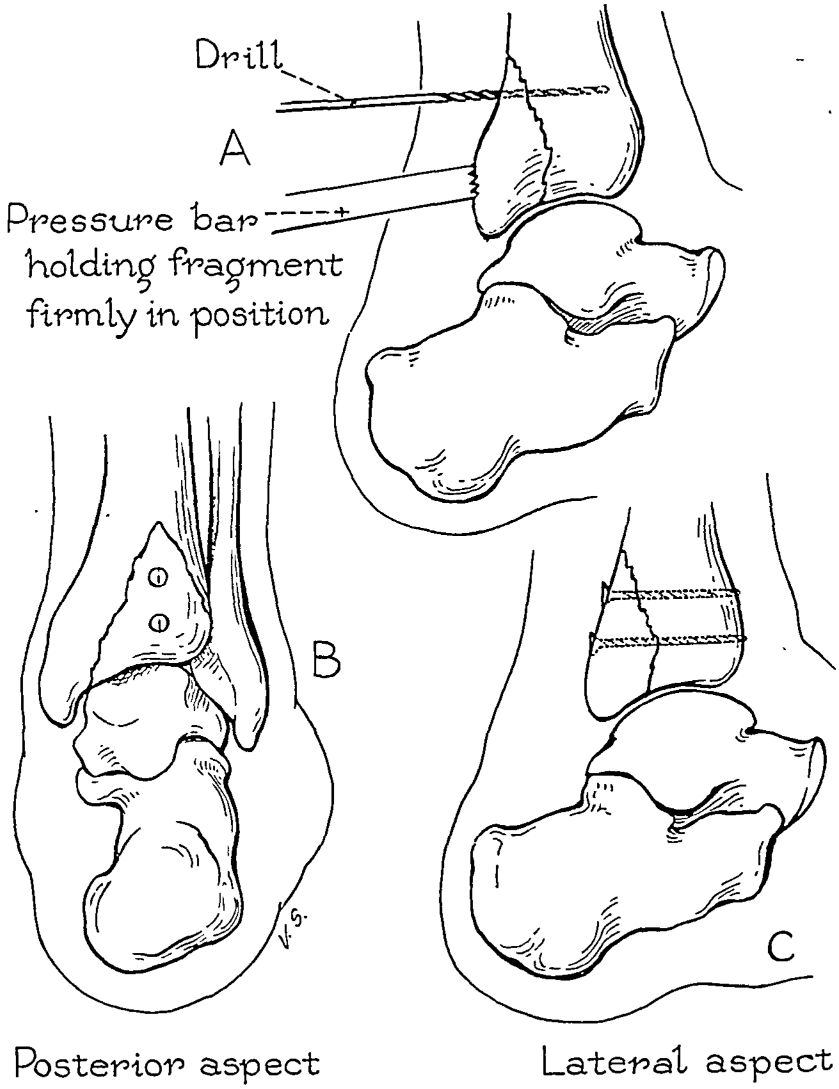


Fig. 4. A, Reduction of the fracture is accurately performed and the posterior lipping fragment is held in place by the pressure bar. The serrated end is broad enough so that further fracture of the thin shell of bone does not occur, while the surgeon drills the hole for the insertion of the first screw. B, Schematic illustration showing fixation of the fragment with two screws. This prevents rotation of the posterior fragment, and adds to the security of the fixation. C, Lateral view of the ankle mortice showing schematically the desired location of the screws with the tips of the screws just engaging the anterior cortex of the tibia. The use of the depth gauge to select the correct length of the screw is most important.

Instruments, too, are important and deserve some discussion. We have run the gamut of periosteal elevator, screw drivers, and more blunt instruments of various kinds for holding the marginal fragment in position while the surgeon drills at least two holes and fixes it with two screws. This perhaps is the most critical stage of the operation and on which

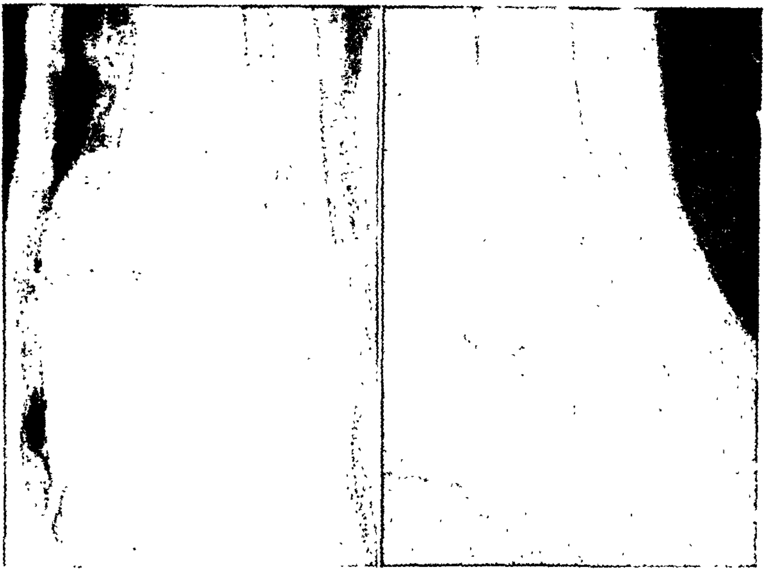


Fig. 5. M. C., injured Nov. 2, 1947 Preoperative films taken Nov. 4, 1947, after an unsuccessful closed reduction done elsewhere.

a successful outcome depends If the thinly shelled fragment is further fractured by the surgeon the patient would not be much better off than had he not been operated on in the first place. For this reason, one of us (E. L. S.) has designed a pressure bar (Fig. 2). The bar is 12 inches in length, made of stainless steel, is $\frac{3}{8}$ of an inch in diameter, one end of which is fitted with a handle and the other with fine teeth or serrations. With the aid of the bar the fracture fragments can be gently pressed and held in position without danger of comminution or of the pressure bar skidding off from the fragment (Fig. 3).

With the patient in the prone position an incision is made over the posterior medial aspect of the distal one-fourth of the leg, about $\frac{3}{4}$ of an inch medial to the midline of the Achilles tendon. The incision is carried down to the level of the internal malleolus. The incision carries one thr [illegible] skin, the superficial fascia, the investing fascia, and finally the flexor retinaculum of the ankle. Care must be exercised when cutting through the investing fascia and flexor retinaculum because on the medial aspect of the incision lies the posterior tibial nerve and artery. These must be carefully isolated and retracted to the medial side. The Achilles tendon is retracted to the lateral side. Immediately anterior to the tendon lies the thick belly of the flexor hallucis longus muscle. This likewise is gently retracted laterally and the posterior aspect of the tibia and fracture come into view. The periosteum must be thoroughly stripped from the posterior aspect of the tibia and sufficient periosteum must be removed from the fractured edge of the posterior lipping fracture so that the small teethlike serrations of the fragments can be fitted accurately into place. At no time is any attempt made to expo[illegible] articulations for direct vision. If o [illegible] rately

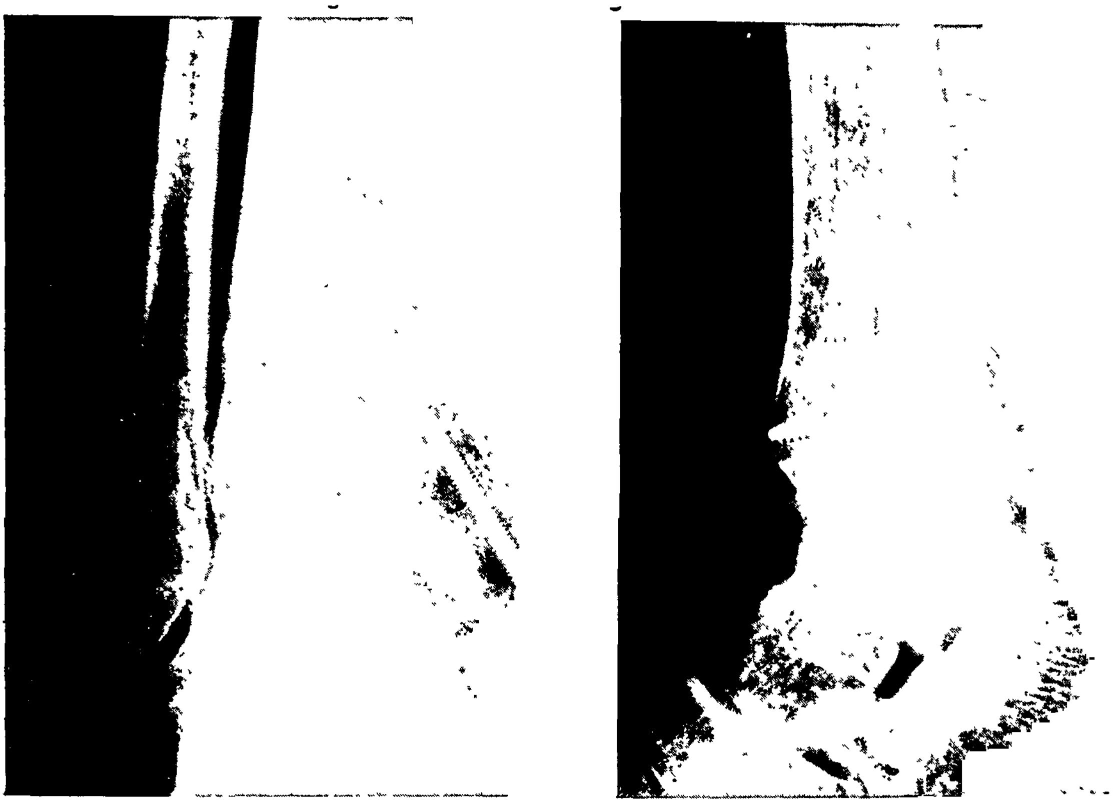


Fig. 6. Same patient as in Figure 5. Films showing end result on May 15, 1943.

see the reapposition of the fragments on the posterior aspect of the tibia and they fit in the anatomic location, the articular surface cannot help but be accurately reduced (Fig. 4). The foot is now gently pushed forward to reduce the posterior dislocation and the marginal fractures manipulated into position. It is here that the pressure bar and the neurosurgical aspirator become of inestimable value. Unless one fits the fragment via its serrations into the serrations of the tibia with great care and accuracy one cannot be sure of an anatomic reduction, and this is the prime object of the operation. When the fragment is pressed home blood is expressed from the jagged fractured edges and obscures vision, but with the aid of the aspirator this troublesome matter is soon under control. The fragment is firmly held in place by the assistant until the surgeon drills at least two holes through the two fragments. It is very important that the hole to the proximal fragment be slightly larger than that in the distal fragment, so that the threads engage only the distal fragment and will permit the drawing together of the posterior lip to the main tibial fragment when the last few turns are applied to the screw. In view of the fact that the hole penetrates the anterior aspect of the tibia, if the screw is at all too long it will interfere with the soft tissues on the anterior aspect. For this reason we have found it most important to use a Jackson depth gauge (Fig. 2) and measure very accurately the length of the screw that must be used. It has been our experience that with the use of the gauge we have never placed a screw too far through the front aspect of the tibia. A screw that does not catch the anterior cortex of the tibia does not have much holding power because the cancellous bone at the lower end of the tibia is very friable.

Two screws are used whenever possible as this prevents the rotation of the fragment and also prevents the possibility of muscle spasm from pulling back on the Achilles tendon, thereby producing a slight subluxation of the astragalus with some diastasis of the posterior lip of the tibia (Figs. 5 and 6).

Before closing the wound it has been our

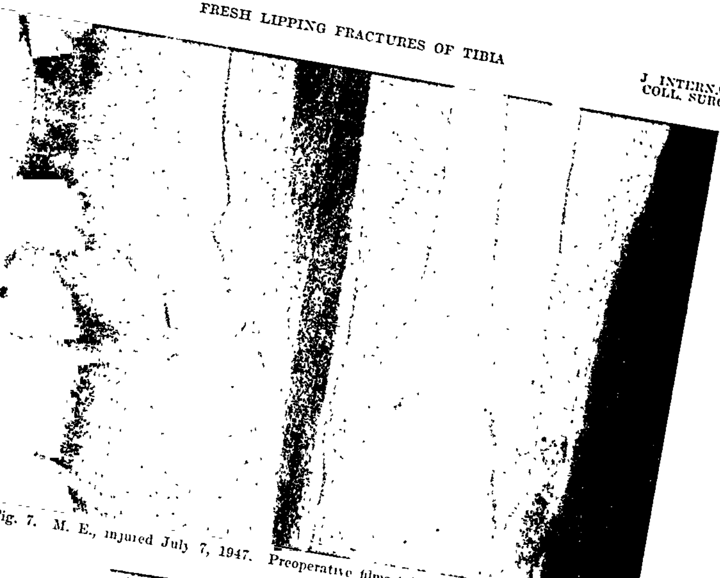
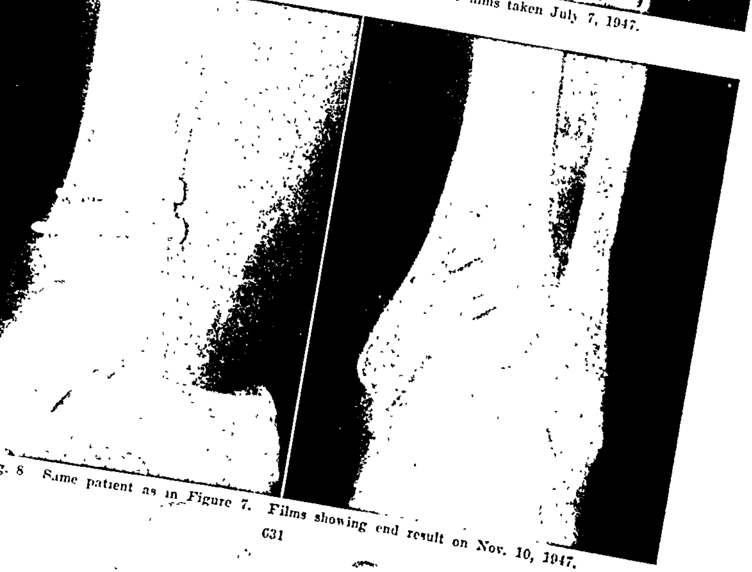
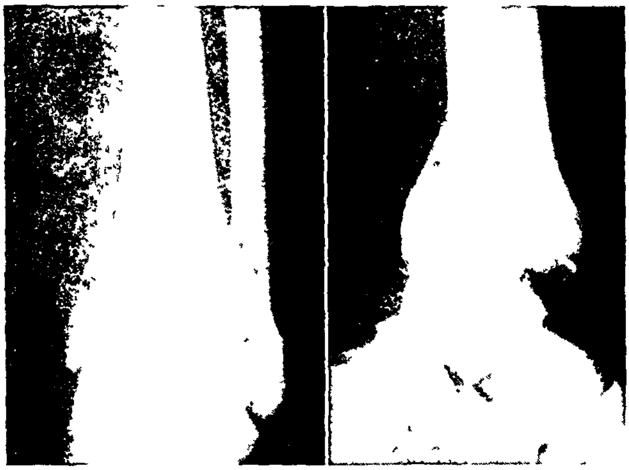


Fig. 7. M. E., injured July 7, 1947. Preoperative films taken July 7, 1947.



g. 8 Same patient as in Figure 7. Films showing end result on Nov. 10, 1947.



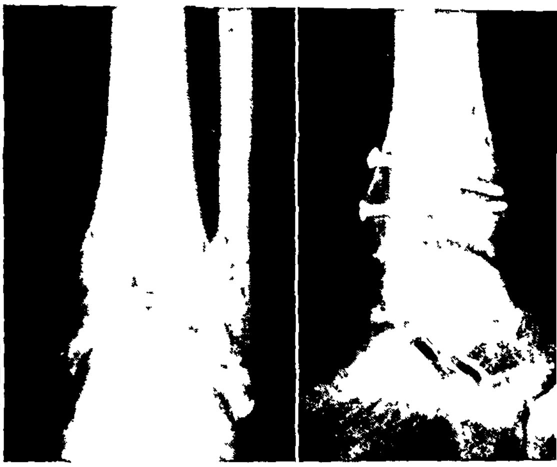


Fig. 9. Left, A. P., injured March, 3, 1947. Preoperative films taken March 3, 1947.
Fig. 10. Right, same patient, films showing end result on July 11, 1947.

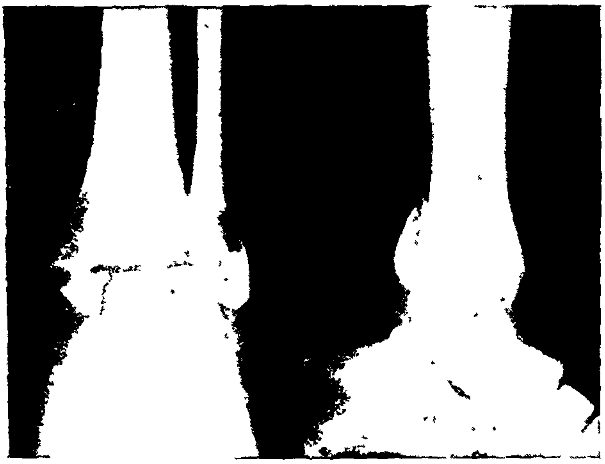


Fig. 11. V. D., injured Jan. 22, 1948. Preoperative films taken Jan. 22, 1948.

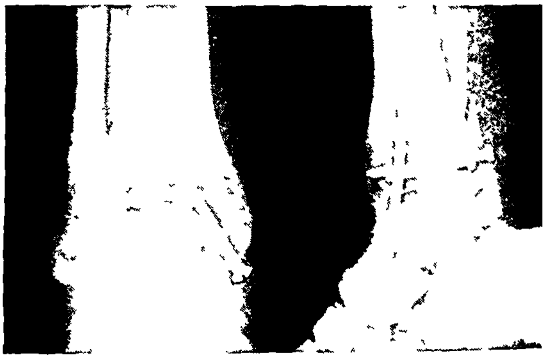


Fig 12. Same patient as in Figure 11. Films sh
ing end result on June 12, 1948.

practice in late years to have a lateral view taken in the operating room to be sure that the screws do not protrude too far through the anterior portion of the tibia and also to be sure that the posterior lip has been accurately reduced with a normal appearing articulation of the tibia. This is the extra safeguard added to the other precautions mentioned above which assure us of accuracy in this procedure. The subcutaneous tissues are closed by a running stitch of 000 chromic catgut and black silk is used for the skin closure. Finally, a cast is applied extending from the middle third of the thigh down to the toes with a slight amount of flexion at the knee and the foot at about right angles to the long axis of the leg. An elastic bandage is applied over the dressings in or
to prevent postoperative edema to the str
tures. The bandage extends from the t
to the middle third of the leg (Figs. 7 and

A change of cast is made at the time
sutures are removed, usually on the twel
or fourteenth postoperative day, and then
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the toes to the middle third of the thigh.
the end of 10 weeks the cast is cut just bel
the knee so as to permit knee motion, yet
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Under no circumstances is any weight beari
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that the patient can receive physiotherapy
the form of heat, massage and passive ex
cises. By the use of competent physiothera
the patient regains a surprisingly gr
amount of his original ankle motion (Fi
9 and 10).

Cases that are not operated on within the first five to seven days become progressively more difficult to reduce and we have had great difficulty in obtaining anatomic reapposition after a period of 14 to 16 days after injury for the reasons mentioned previously.

Cases that are seen late cannot hope to have this form of treatment as it is totally unsuccessful. We believe that the patient who has a great deal of pain and osteoarthritic changes of the ankle should have an ankle fusion performed. We have tried various standard methods with uniformly good success (Figs. 11 and 12).

CONCLUSIONS

Twenty-three cases of this type of fracture have been operated on by the authors in the last six years with uniformly good success.

Early operation, accurate reduction, and firm internal fixation by the use of two screws are essential. Before closing the surgical wound it is advisable to have a lateral x-ray taken to be sure that the screws do not protrude beyond the anterior cortex of the tibia and that the joint surface of the tibia has been anatomically reapposed. Unless this is done the operation cannot be classed as successful.

It has been the experience of the authors that it is necessary to use a constrictor, a surgical aspirator, a pressure bar, and a Jackson depth gauge in order to perform accurately internal fixation under direct vision. Without clear vision the most skilled surgeon would be working under a terrific handicap in this type of procedure.

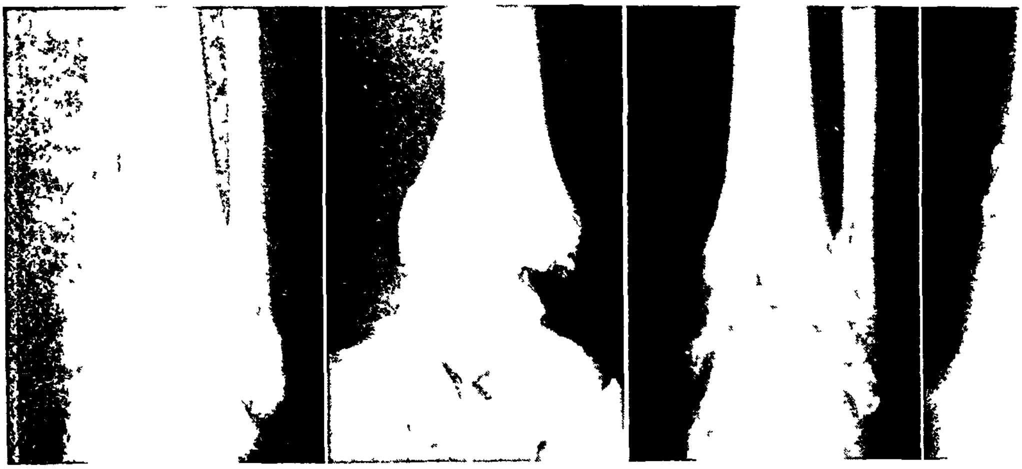

Fig 9. Left, A P., injured March, 3, 1947. Preoperative films taken
Fig. 10. Right, same patient, films showing end result on July 1

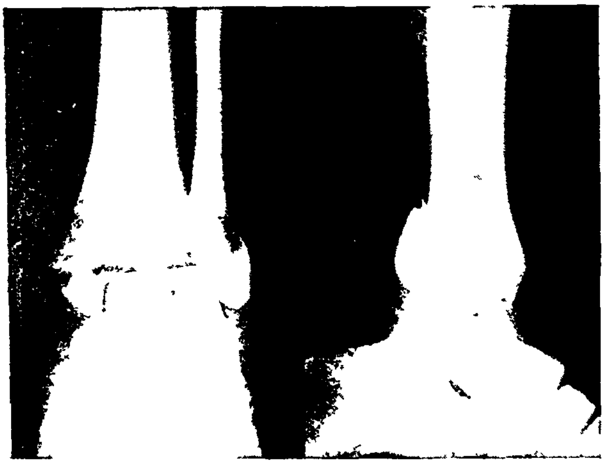

Fig. 11. V D., injured Jan. 22, 1948. Preoperative films taken Jan. 22, 1948.

Fig 12. Same pat
ing end

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Various associated anomalies and deformities may be associated with spina bifida. Harelip, cleft palate, ectopia of the bladder, syndactylism, nonparalytic clubfoot, congenital dislocation of the hip and so on, may be present. In the more severe forms of spina bifida, the lower extremities may develop trophic ulcerations; paralytic forms of clubfoot may be present and the constant dribbling of urine may lead to excoriation of the external genitalia. The growth of the lower extremities lags behind the rest of the body and if the child lives till puberty or longer, there is marked disproportion between the upper parts of the body and trunk and the lower extremities.

One of the most important secondary lesions of surgical importance is the so-called Arnold-Chiari malformation of the cerebellum and medulla oblongata. The medulla oblongata is elongated and extends downward into the spinal canal so that the lower part of the fourth ventricle is below the foramen magnum. As a rule the cerebellar tonsils are elongated and extend down into the spinal canal. Together with the lingula they are often plastered to the fourth ventricle and medulla with dense adhesions. The cranial nerves that arise from the pons and medulla are necessarily elongated and the upper cervical spinal nerves are also elongated and run cephalad to reach their exits at the intervertebral foramina. The elongation of medulla and cerebellum results in blocking of the lower end of the fourth ventricle and the adhesions of the cerebellar lingula and tonsils to the medulla and fourth ventricle obliterate the posterior cistern. Thus an obstructive hydrocephalus is produced. In the author's experience, this is the usual, if not the sole cause of the hydrocephalus so often seen in spina bifida. This is in agreement with the recent statements of Campbell.[1]

The mechanism of the malformation has been explained by Lichtenstein.[7] In spina bifida the spinal cord or membranes have an abnormal attachment to the surrounding and overlying tissues. Such an abnormal attachment can even exist (although not usually) in spina bifida occulta. It results in traction on the neuraxis above the level of the malformation as the spinal column elongates. The more rapid elongation of the spinal column in comparison to the neuraxis is well known. The spinal cord extends for the full length of the embryo during the early development, but from the fourth month on the vertebral column elongates more rapidly than the cord. At birth, the tip of the spinal cord reaches only to the third lumbar vertebra, and in the adult to the lower border of the first lumbar vertebra. Any abnormal attachment of the cord, nerve roots or meninges to the spinal column or overlying parts will produce traction on the neuraxis during both prenatal and postnatal growth. Thus, not only may the medulla and cerebellum be pulled down into the spinal canal, but the midbrain likewise may be elongated and pulled down into the posterior fossa. Thus a stenosis of the aqueduct of Sylvius may be produced and this may be one of the factors in the associated hydrocephalus.

Surgical opinion naturally varies on the selection of cases of spina bifida for operation and the proper time for intervention. It may be generally stated in spina bifida that a neurologic deficit which can be recognized early in life, will tend to grow worse with time, rather than improve. The continued traction on the neuraxis will produce symptoms in some cases late in puberty or adult life and will probably exacerbate symptoms already present. It is well known that hydrocephalus, if at first not apparent, may develop after a few months and what is worse, from the standpoint of the surgeon, may develop rapidly after operation on the spina bifida.

Cases of myelocele that show complete flaccidity of the lower extremities with no spontaneous movements and gaping with loss of tone of the rectal sphincter should not be operated on. These infants, even if life is preserved, will be hopeless invalids. Most of them develop varying grades of hydrocephalus and the rare case that survives to reach adult life is generally mentally retarded. If partial function of the lower extremities is present, operative repair may be undertaken, but the parents must be warned that permanent impairment of neurologic function will likely be present and that hydrocephalus may develop.

Meningoceles and cases of spina bifida with lipoma should be operated on, but even here, the possibility of late neurologic sequelae should be explained to the parents and particularly that these sequelae are likely to include difficulty with control of the bladder or urinary retention.

No agreement exists about the proper time to operate. It is best to wait until the child is at least a month old. If the spina bifida is not covered with skin or epithelium at birth, it should be allowed to epithelize before operation. These infants should be nursed on their face with the hips elevated by a sandbag or a firm pillow. A diaper may be placed beneath the hips and legs. In this position excreta fall away from the spina bifida, the pressure is low in the spina bifida and drainage of the cerebrospinal fluid, if present, is lessened. Exposure of the unepithelized area under a light cradle usually is the best means of promoting epithelization. If there is superficial necrosis or infection, moist boric acid dressings or sulfathiazole ointment dressings may be used until clean granulations are obtained.

Occasionally it may be necessary to operate without further delay because of slowness in healing of a large unepithelized area or because of profuse cerebrospinal fluid drainage. In most of these cases there is complete loss of function of the lower extremities. However, in selected cases of this type, plastic repair of the spina bifida may be justifiable in order to facilitate the nursing care of the patient. Operation may make it possible to care for such a child at home, or in a nursing home, and thus free a hospital bed of a chronic hopeless case. This is the only exception to the previous statement that cases with complete loss of function in the lower extremities should not be operated on.

SURGICAL REPAIR

The principles of the operation are simple, but the performance may at times be very difficult. The base of the sac is encircled by an elliptical incision. This may be vertical in cervical and dorsal meningoceles, but in the lumbosacral variety, it should be transverse so as to keep it as high above the gluteal fold as possible. Where the skin is ample, the incision is planned to allow approximation without tension. If there is a large skin defect, the incision must spare all normal skin.

The skin and subcutaneous tissue are dissected back from the sac and the base of the sac mobilized. Then the sac is opened on one side (not at the top) and the contents inspected. If there is no myelocele, the sac may then be resected, leaving ample dura at the base for closure. Any nerve roots in the sac must be carefully mobilized, and returned to the spinal canal. If there is a myelocele, it must be carefully freed from the skin or epithelium above, and returned to the spinal canal.

In cases of large myelocele with extensive cleft in the vertebral arches the reconstruction of a membranous spinal canal is difficult and often not satisfactory. If possible, the rudimentary dura is approximated over the myelocele without tension. If the sacrospinalis muscles can be approximated across the midline, so much the better. If they cannot, then fascial flaps are fashioned by making lateral incisions in the lumbar fascia. These flaps have their base toward the midline. They are reflected and sutured across the midline, overlapping them if possible. This step should always be carried out, if it is not possible to directly approximate the lumbar fascia. Sometimes only relaxing lateral incisions in the lumbar fascia may permit its approximation.

When large skin defects are present, the closure of the skin may be a major problem. Usually some form of "Z" plastic is satisfactory; occasionally a pedicled flap may be required. In any case the operative area must be covered with viable skin sutured without undue tension. Failure to accomplish this will result in breaking down of the wound, often with establishment of a cerebrospinal fluid fistula.

In common with Ingraham[6] and Elsberg,[5] I have found no value in preserving the s
as a prophylaxis against hydrocephalus.
recommended by Penfield and Cone.[9] A
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The skin and subcutaneous tissue are dissected back from the sac and the base of the sac mobilized. Then the sac is opened on one side (not at the top) and the contents inspected. If there is no myelocele, the sac may then be resected, leaving ample dura at the base for closure. Any nerve roots in the sac must be carefully mobilized, and returned to the spinal canal. If there is a myelocele, it must be carefully freed from the skin or epithelium above, and returned to the spinal canal.

In cases of large myelocele with extensive cleft in the vertebral arches the reconstruction of a membranous spinal canal is difficult and often not satisfactory. If possible, the rudimentary dura is approximated over the myelocele without tension. If the sacrospinalis muscles can be approximated across the midline, so much the better. If they cannot, then fascial flaps are fashioned by making lateral incisions in the lumbar fascia. These flaps have their base toward the midline. They are reflected and sutured across the midline, overlapping them if possible. This step should always be carried out, if it is not possible to directly approximate the lumbar fascia. Sometimes only relaxing lateral incisions in the lumbar fascia may permit its approximation.

When large skin defects are present, the closure of the skin may be a major problem. Usually some form of "Z" plastic is satisfactory; occasionally a pedicled flap may be required. In any case the operative area must be covered with viable skin sutured without undue tension. Failure to accomplish this will result in breaking down of the wound, often with establishment of a cerebrospinal fluid fistula.

In common with Ingraham[6] and Elsberg,[5] I have found no value in preserving the sac as a prophylaxis against hydrocephalus, as recommended by Penfield and Cone.[9] As a matter of fact, preservation of the sac is impossible in the more severe cases in which hydrocephalus is most apt to develop.

After operation these children are nursed

SUMARIO

La espina bifida y el craneo bifido son defectos congenitales que pueden ser simples o estar asociados con defectos congenitales del sistema nervioso central. En general el tratamiento quirurgico de estas lesiones no es dificil. Sin embargo la seleccion de los pacientes para la cirugia y el tratamiento de las complicaciones neurologicas pueden hasta taxar la ingenuidad del cirujano mas experimentado. Cada caso debe de ser estudiado con gran cuidado y su tratamiento debe de ser individualizado.

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be exercised to avoid injury to the oculomotor nerve or to the carotid artery and its branches.

The dura should be sutured and the wound may then be closed in the usual manner. Dandy's suggestion of a preoperative encasement of the head in a plaster cast, to avoid collapse of the cerebral hemispheres after drainage of the ventricle, has neither logical basis or merit. The immediate postoperative care of these children is similar to that of craniotomies in general.

Cranium bifidum is much less common than spina bifida. Ingraham and his associates reported 84 cases of cranium bifidum at the same time that they reported 462 cases of spina bifida, a ratio of 1 to 5.5. In the author's experience the ratio has been approximately 1 to 5. These cranial defects are generally in the midline, although they may occur anywhere. They are most frequent in the occipital region. Ingraham *et al.* had 75 per cent of their cases in the occipital region. Cranium bifidum may be simple or have associated meningoceles or encephaloceles. The latter may represent heterotropia of various types. In one of my cases abortive reduplication of the brain was found in a large occipital meningocele. In severe cases surgery is obviously not indicated because of the serious associated cerebral malformations. Severe hydrocephalus is also a contraindication. In addition to a complete history and general physical and neurologic examination it is wise to carry out diagnostic air studies as an aid in the preoperative evaluation of these patients.

The surgical repair of these defects usually is not difficult as the cases that are suitable for surgical intervention as a rule are covered with sufficient normal skin. The occipital cases, which are the most frequent, usually have sufficient occipital muscle or fascia for an additional layer of closure in addition to the dura below and the skin above. Seldom can the contents of the sac, if an encephalocele, be returned to the intracranial cavity. They have to be sacrificed by amputation. The large encephaloceles are usually associated with other brain deformities and consequently are not amenable to surgery.

The repair of the cranial defect is not indicated in infancy. It may be repaired later on in childhood, especially if in the frontal region and producing a cosmetic defect. The occasional encephalocele or myelocele at the base of the brain presents a difficult problem that can sometimes be successfully solved as Dandy[2] and Ingraham and Matson[6] have shown. These authors have reported successful extirpation of such lesions, using an intracranial approach.

SUMMARY

Spina bifida and cranium bifidum are congenital defects in the vertebral column and skull that may be simple or may be associated with more or less severe neurologic defects. The surgical management of these lesions is not difficult but the selection of patients for surgery and the management of the neurologic complications may tax the skill and ingenuity of the most experienced surgeon. Each case must be carefully studied and its management adapted to its individual needs.

SOMMAIRE

La spina bifida et la bifida cranienne sont dûes à des défauts congénitaux de la colonne vertébrale et du crâne, cette malformation peut être simple ou associée avec des lésions plus où moins grâves du système nerveux. Le traitement chirurgical de ces lésions n'est pas difficile, mais le choix des malades pour la chirurgie et pour le traitement des complications névralgiques exige le talent et l'ingénuité du plus habile chirurgien. Chaque cas demande une attention soignée et le traitement doit être adapté aux indications individuelles.

RIASSUNTO

La spina bifida ed il cranio bifido sono anomalie congenite che possono essere semplici difetti ossei, od essere associati ad anomalie piu' o meno gravi del sistema nervoso. Il trattamento chirurgico non e' difficile: ma la selezione dei pazienti ed il trattamento delle complicazioni neurologiche possono mettere a dura prova l'abilita' e l'intraprendenza del chirurgo. Ogni caso va studiato a parte, e la scelta della cura adattata alle singole necessita'.

SUMARIO

La espina bifida y el craneo bifido son defectos congenitales que pueden ser simples o estar asociados con defectos congenitales del sistema nervioso central. En general el tratamiento quirurgico de estas lesiones no es dificil. Sin embargo la seleccion de los pacientes para la cirugia y el tratamiento de las complicaciones neurologicas pueden hasta taxar la ingenuidad del cirujano mas experimentado. Cada caso debe de ser estudiado con gran cuidado y su tratamiento debe de ser individualizado.

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Progress in the Treatment of Hyperthyroidism[*]

ARNOLD S. JACKSON, M.D., F.A.C.S., F.I.C.S.[†]
MADISON, WISCONSIN

THE recent additions of thiouracil, propylthiouracil, and radioactive iodine to the armamentarium of those interested in the treatment of hyperthyroidism has greatly stimulated interest in this subject. At the last meeting of the American Association for the Study of Goiter held at Toronto in May, two days of the three-day program were devoted largely to a discussion of these new therapeutic agents.

Interest in this subject had been waning in recent years because of inability to find more successful methods of dealing with toxic goiter. Plummer's great contribution of Lugol's solution in 1922 [1] had revolutionized the treatment of exophthalmic goiter, but results with its use in the therapy of toxic adenoma had proved disappointing. In 1936 Freeman and I [2] reported that in a study of 279 patients with toxic adenoma 38 per cent were made worse by iodine, while 62 per cent were either not affected or only slightly improved. Thus, prior to the discovery of thiouracil by Astwood [3] in 1943, there was no effective agent to be used either in the preoperative or postoperative care of these patients. The mortality rate in the surgical treatment of advanced cases of this type remained comparatively high even in the hands of the most experienced thyroid surgeon. In the patient desperately ill, digitalis, oxygen, transfusions, and other agents were all used unsuccessfully. A two-stage operation was needed to assure the patient's recovery.

The discovery of the antithyroid drugs brought about as remarkable results in the treatment of these cases as had Lugol's solution in exophthalmic goiter. It has been shown repeatedly that after several months of preparation with these drugs patients with the most advanced type of multiple toxic adenoma can be operated upon with little more risk than the nontoxic patient. At the Chicago meeting of the American Medical Association this year I demonstrated an exhibit on this subject, and the question was repeatedly asked, "When are these patients ready for surgery?" There is no fixed rule by which one may judge when a thyroidectomy may safely be performed. If one must err, treatment should be continued over too long rather than too short a period. With proper precautions and frequent checks of the patient's condition no harm will be done.

For the past two years I have not used thiouracil, believing that equally good results will be obtained with propylthiouracil, a far safer drug. While no fatalities have been reported either in Europe or this country with the use of the latter drug, cases of agranulocytosis have occurred, so that the white blood cell count should be checked every three weeks and the patient warned of a possible reaction, such as skin eruption, fever, gastrointestinal upset, and sore throat.

PROPYLTHIOURACIL

Toxic Adenoma. There is no special reason for using this drug in preparing the mildly toxic patient for surgery. One's experience must tell him whether or not the patient is a good surgical risk. Certainly in these patients the basal metabolic rate is not an index of the degree of operative risk. A patient may have a rate of only +25 per cent but may still be a poor surgical risk because of severe cardiac, vascular, renal, and liver changes. If there has been little loss of weight and strength and if the hyperthyroidism is of short duration, the patient may probably be operated upon without preliminary preparation with propylthiouracil. If in doubt, the drug should be given and for not less than six weeks. Then, if the patient has shown considerable improvement and if all tests are satisfactory, operation may be safely performed after three weeks' treatment with Lugol's solution. In more serious cases the period of preparation may require many months. One should always remember that the advice of Charles Mayo concerning exophthalmic goiter to the effect that "It never requires an emergency operation," may now also apply in toxic adenoma. It is better to take too long rather than too short a time to prepare these patients for thyroidectomy.

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[*] From the Frieda Meyers Nishan Foundation for the Study of Goiter at the Jackson Clinic, Madison, Wisconsin.

[†] President of the American Goiter Association.

Propylthiouracil has one distinct disadvantage; it makes the operation technically more difficult, despite preoperative iodine therapy, because with its use the gland becomes more friable and more vascular. Rather than continue iodine over long periods of time in the preoperative treatment, we have reserved its use for the two or three weeks preceding thyroidectomy. Longer use of iodine has not eliminated the disadvantages of propylthiouracil and has increased them by delaying the advantageous effects of the drug.

Dosage in Toxic Adenoma. Another question frequently asked is that regarding the dosage of propylthiouracil Again the treatment cannot be standardized but must be suited to the individual patient. In a series of 175 patients with hyperthyroidism whom we treated with propylthiouracil, the average dose administered was 50 mg. three times a day. Others have used considerably larger doses with possibly quicker results in some instances but ultimately with the same outcome. The question arises as to whether or not a larger dosage is potentially more dangerous. I do not know, and I doubt if enough is known about the action of this drug to answer this question positively at this time. I do know that, as was the case in using thiouracil, by using conservative doses of propylthiouracil no serious reactions were observed in my series. One young physician asked why I did not use 400 or 500 mg. of the drug, so that I could obtain more spectacular results such as he believed he was obtaining. My answer was that I would never give anything to a patient that I would hesitate giving a member of my family.

From what knowledge we have, it does seem that the drug may be given with comparative safety in doses up to 200 or 300 mg. a day. Probably the size of the drug is not the factor that causes the reaction; rather, it is the individual's sensitivity to it When thiouracil was in vogue, it was known that the drug might be used for months without harm, but that after resumption of it following a rest period, a serious and at times fatal reaction might occur. The number of persons killed by this drug will never be known, but there were a great many, and not all of them were patients with hyperthyroidism. This drug should never have been released for general distribution but should have been continued on a research basis until the far safer propylthiouracil was available.

Propylthiouracil, then, is of paramount importance in the preoperative treatment of toxic adenoma. There seems to be no indication for its use postoperatively. There rarely is recurrence of this form of toxic goiter.

Exophthalmic Goiter. What of the use of propylthiouracil in exophthalmic goiter? One might first go back to 1922 when Plummer showed the remarkable effect of iodine in the preoperative preparation of this disease. Great was the skepticism regarding this revolutionary change in the concepts of that day. I recall submitting a paper to the *Journal of the American Medical Association* in 1923 on the use of Lugol's solution in the preoperative preparation of exophthalmic goiter, and having the paper returned because it was considered too radical a departure from the generally accepted theories. This paper, published the same year in *The American Journal of Surgery*, was a review of ideas I had gained as a student of Plummer's, together with a review of 30 of my own cases.[4] Shortly thereafter attention was directed to the great value of iodine in the postoperative period, to its effect of causing the hyperplastic gland to revert to a colloid state, to the danger of its prolonged use preoperatively, for which the name "iodine-fast" exophthalmic goiter was suggested, and to the greater value of large, rather than small, doses in the immediate postoperative care.[5-8] Attention was also called to the possibility of initiating hyperthyroidism in nontoxic adenoma by the injudicious use of iodine, and the term "iodine hyperthyroidism" was suggested for this syndrome.[9] In 1925 it was shown that the use of iodine made unnecessary the then popular ligation operation and that primary thyroidectomy was a safe operation for exophthalmic goiter.[10]

During the ensuing years many contributions to the treatment of exophthalmic goiter were brought forth. For a few years roentgenotherapy had many supporters, but the sum total of various studies showed that while the disease might be partially controlled, it was seldom cured by this method. Then for a time denervation of the adrenal gland received popular acclaim. Soon, however, this operation fell into disrepute, as it failed to obtain results. So down through the years iodine remained the method of choice until thiouracil was developed. For a while it seemed that this drug might be the answer to the long sought nonsurgical method of cure. Not only did this prove to be a false hope, but the drug actually resulted in a higher mortality rate from the disease than did surgery. Then came propylthiouracil, and we are about able to say that the percentage of cases that may be cured with this drug is so small that this method is only justified from a research standpoint. Out of 75 patients whom I treated for a period of from 6 to 12 months with this drug all but 3 had a recurrence of symptoms when the drug was discontinued. At present I am studying a smaller group of cases that have been on the drug for nearly two years, and there is a possibility that some of these cases may be cured, or rather arrested. Bartels[11] stated that this drug will not cure exophthalmic goiter.

In the past six months I have largely abandoned the use of propylthiouracil in the preoperative treatment of exophthalmic goiter, except in severe or complicated cases. The average case is now prepared as formerly with iodine for 10 to 14 days; then a primary thyroidectomy is performed. In addition to the other disadvantages in using propylthiouracil, there is the prolonged delay which is objectionable to some patients. On the other hand, we are continuing to try it in certain persistent and recurrent cases, in children, and in the aged. It might be indicated in a pregnant woman after six months.

OTHER DRUGS

At this time there is little to suggest that methylthiouracil will prove any more effective. What about radioactive iodine? Perhaps one might best summarize the reports of practically all the pioneer investigators who were represented on the last program of the American Goiter Association for the Study of Goiter. Radioactive iodine has proved disappointing in the treatment of cancer of the thyroid; few, if any, such patients have been cured, because only certain areas of malignancy are destroyed. It holds considerably more promise in the treatment of exophthalmic goiter. While most investigators have been cautious about reporting cures, Means,[12] who directed the Boston group's studies, reported that radioactive iodine may totally ablate the thyroid gland and thus terminate hyperthyroidism, but what the end results will be is still to be determined. Certain patients may develop myxedema, and Means stated that even the development of malignancy cannot be excluded. Further study of much larger series of cases will be necessary before an accurate appraisal of the value of radioactive iodine in the field of thyroid therapy may be made.

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Androgens in Gynecology

J. P. GREENHILL, M.D., F.A.C.S., F.I.C.S.
CHICAGO, ILLINOIS

SINCE the isolation and clinical application of the androgens there has been a controversy concerning the use of these hormones in women. Some gynecologists and endocrinologists maintain that the male hormone has no place in the treatment of gynecologic disorders, but others believe the androgens are decidedly helpful in overcoming some disorders of the female genital tract. I have found several indications for the use of androgens in women.

The male hormone, testosterone, resembles the corpus luteum hormone, progesterone, in many of the physiologic responses to its use. On this basis, androgens are being administered to overcome certain gynecologic disorders. It has been shown conclusively that testosterone, the male hormone, or its derivative, testosterone propionate, is capable of inducing proliferation of a progestational character of the endometrium in rabbits and rats.[1] Like progesterone, it will inhibit uterine contractions induced by estrin,[2] maintain pregnancy following the excision of the ovaries, and delay parturition in the normal pregnant rat.[3] Furthermore, it is effective in neutralizing vaginal and uterine responses to estrin and is capable of completely suppressing spontaneous estrus cycles in rats and mice.[4] It is significant that testosterone propionate is four to eight times more active than progesterone in the latter reaction, being effective in doses of 0.05 to 0.1 mg. daily.[5]

Other effects have been obtained in primates by injections of testosterone propionate. Zuckerman[6] induced ovarian atrophy and endometrial involution in monkeys while menstruation was completely suppressed throughout the duration of treatment. In normal women, Hartman[7] and Papanicolaou, Ripley and Shorr[8] have obtained similar results.

It was suggested that some gynecologic disorders which on a theoretical basis should respond to progesterone, might also respond to androgenic therapy. In this regard painful breasts and dysmenorrhea first received the attention of gynecologists.

Desmarest and Capitaine[9] report excellent results in these conditions. The ability of testosterone to suppress menses suggested its application in the treatment of excessive uterine bleeding. Loeser,[10] who was a pioneer in the use of androgens and who has made many valuable contributions to the subject, injected doses of 50 mg. of testosterone propionate every other day into patients with menorrhagia and was able to control the flow. He maintained that about 500 mg. during the month was necessary to suppress the menstrual bleeding until the next period, while 300 mg. postponed the menses for about eight to ten days. Biopsies of the endometrium revealed that this tissue had undergone atrophy. Loeser noted also that fibromyomas decreased in size significantly under this therapy. He obtained beneficial responses also in two cases of chronic cystic mastitis and in several cases of dysmenorrhea, using somewhat smaller doses (150 to 300 mg.).

Additional information regarding the therapeutic value of testosterone propionate was reported by Foss[11] who treated 16 cases of excessive menstrual bleeding of functional origin with excellent results in most instances. The dosages which he administered were quite large, 300 to 800 mg., and he injected as much as 2,000 mg. in resistant cases. Ovulation was inhibited as indicated by endometrial biopsies. Foss noted that several patients under androgenic therapy developed hot flushes and other symptoms of the menopause. The beneficial effect of testosterone on excessive bleeding was further confirmed by Geist, Salmon and Gaines,[12] who obtained gratifying results in 24 out of 25 cases and by Mazer and Mazer[13] who reported excellent results in uterine bleeding.

My results[14] confirm the observation of others that in the human being, testosterone propionate inhibits ovarian activity with the suppress[illegible] uterine bleedi[illegible] [illegible] in-tion of the accessory sex organs, including the breasts, uterus, and vaginal mucosa. Fibromyomas, which are also under the influence of the ovary, regress. These anatomic changes persist only as long as the patient is under the influence of the androgen. It is apparent that the mechanism by which testosterone propionate produces these changes is not through its progestational action, since changes typical of progesterone have not been demonstrated in the endometrium but through suppression of ovarian activity. It is not unlikely that the therapeutic results which are claimed for progesterone itself are due to this response rather than that of the endometrium. As a matter of fact, the significance of endometrial changes in ovarian dysfunction has been frequently postulated but never conclusively demonstrated for such common disorders as menorrhagia or dysmenorrhea. One may find any stage of endometrial development from the resting phase to the secretory. The fact that normal secretory endometrium is frequently found in patients with excessive menstrual flow indicates that this bleeding is not due to the lack of corpus luteum activity as is commonly believed. Hence, the proposed therapy of this condition with progesterone is not on a sound basis. In reality, evidence indicates that relatively large doses of progesterone, amounting to 100 mg. or more in the last ten days of a cycle, are usually ineffective in controlling uterine bleeding.[15] The concept that functional bleeding is due to endometrial hyperplasia might also be abandoned, since it has been sufficiently demonstrated that hyperplasia is not as frequently associated with menorrhagia as formerly believed. In fact, hyperplasia is often seen in cases of amenorrhea or in women with normal menstrual cycles. The attempt to control excessive flow should therefore not consist primarily of attempting to alter the endometrium, since it seems quite possible that there is no correlation between excessive bleeding and histologic changes of the endometrium. It is my belief that we must look elsewhere than the endometrium for the etiology of these ovarian dysfunctions and the explanation for the therapeutic responses in these conditions.

The mechanism by which testosterone propionate influences the ovarian function in human beings has been suggested by Foss to be through its action in suppressing pituitary activity, on the bases of the endometrial changes which he obtained in the human being. Geist has considered the modus operandi of this substance to be somewhat complex and in some respects paradoxical. For instance, in primates testosterone induces ovarian inactivity and subsequent involution of the accessory sex organs, while in the rodent, it produces progestational proliferation, uterine hypertrophy, and persistent corpora lutea in the ovaries.

These seemingly contradictory findings have, however, been explained by Freed, Greenhill, and Soskin,[5] who have demonstrated a biphasic effect of testosterone propionate on the pituitary of the rat. Small amounts were found to inhibit the pituitary follicle-stimulating hormone, resulting in ovarian atrophy and subsequent uterine involution due to lack of estrin. Large doses released the luteinizing hormone, resulting in persisting corpora lutea and a similar suppression of estrin. The uterus underwent hypertrophy, however, because a large dose of androgen is capable of acting directly on the uterus in the absence of estrin as in the castrate rodent. It was suggested, therefore, that the involutionary changes in the reproductive organs of human beings resembled the reaction to the small doses of androgen in the rat. The doses chosen for therapy apparently are relatively small for the human being when compared with that in experimental animals. The findings of Engle and Smith[16] that 25 mg., but not 5 or 10 mg., of testosterone propionate injected daily is capable of inducing a progestational endometrium in monkeys support these conclusions.

From my results and those of other workers in this field, it is not unreasonable to conclude that male hormone therapy has definitely beneficial effects in certain gynecologic disorders. At the present time testosterone propionate has been used with considerable success in the following gynecologic disturbances:

Menopause. The male hormone should be

used instead of estrogens to overcome the distressing symptoms of the menopause in women who had a breast or other organ removed for cancer, in women who have had pelvic endometriosis and in women who bleed when they take estrogens. I usually prescribe a 10-mg. tablet of methyl testosterone daily but some women may have to take two tablets a day. In some cases I combine the male hormone with very small doses of estrogen (0.25 mg.) to overcome the menopausal symptoms. The addition of the androgen to the estrogen usually prevents uterine bleeding in menopausal women who have this tendency.

Dysmenorrhea and *Painful Breasts.* In the treatment of dysmenorrhea and painful breast, suppression of the menses is not necessary to obtain the desired results. It seems that complete ovarian suppression is not essential for some therapeutic responses, and it is possible that the direct antagonism of estrogen by the male hormone plays a role in the treatment of mastopathies and dysmenorrhea.

This neutralizing property of testosterone propionate has been demonstrated both in histologic responses of estrogen and in its myometrial activity. It is possible that the alleviation of dysmenorrhea is on the basis of inhibiting uterine muscle contraction. This explains the results obtained with the injection of 150 to 250 mg. of testosterone propionate in the last two weeks of the cycle wherein the pain was relieved but the menses were not disturbed. This dosage may, in certain cases, be insufficient, however, and injections during the entire month may be required in the severe cases to induce a temporary menopause in order to relieve the pain. I prefer diethylstilbestrol to testosterone for the relief of dysmenorrhea because it is far simpler, considerably less expensive and much more effective.

Endometriosis. Not only may the dysmenorrhea associated with and the constant pain due to endometriosis be relieved by androgens, but also the endometriotic masses may be made to decrease in size temporarily. I have kept quite a few young women comfortable and postponed operation by giving 25 mg. of testosterone propionate hypodermically three times a week for four [illegible] after three or four months, another course of injections must usually be given, but the patient can be left relatively free of pain for years by means of this intermittent therapy.

Premenstrual Tension. By this I mean a group of symptoms which some women have 7 to 10 days before menstruation, and these symptoms include a distended abdomen, swollen, painful breasts, headaches, jitteriness, nervousness and so on. A 10-mg. tablet of methyl testosterone for each of the last 10 days usually relieves this premenstrual tension. It may be added here that the androgens usually have a tonic effect on women.

Excessive Uterine Bleeding. In the treatment of menorrhagia it seems fairly conclusive that large amounts of testosterone propionate such as 25 to 50 mg. hypodermically, three times a week, are required so that ovarian activity is completely suppressed. I have observed several cases where sufficient testosterone propionate was administered to prevent ovulation as detected by endometrial biopsies, but this did not prevent or delay the menses significantly. Ovulation can be inhibited with approximately one-half the amount necessary to suppress menstruation (anovular menstruation). While it is apparent that testosterone propionate has an effect on the pituitary gland and ovaries, it is still not understood why beneficial responses often continue following cessation of testosterone propionate injections. The explanations must await further investigations as to the mechanism of menstruation and the etiology of menstrual disorders. In many cases I use estrogens instead of androgens to control excessive menstrual bleeding.

Mittelschmerz or Intermenstrual Pain. The pain which occurs about half way between two menstrual bleedings and which is believed to be due to ovulation may in some cases be prevented by giving 25 mg of testosterone propionate hypodermically 3 or 4 times or 10 mg. by mouth daily in the first 14 days of the cycle.

Metastases after Cancer of the Breast. The pain which women have from metastases in the spine and elsewhere after radical breast surgery, may be relieved by hypodermic or oral p[illegible] of and[illegible]. If taken by mont[illegible] 100 [illegible]ethyl testosterone must be taken daily and hypodermically, at least 50 mg. must be given two or three times a week. Of course, these women will develop signs and symptoms of virilism, but the pain will be relieved. In women past 60 years of age I use estrogens instead of androgens to relieve the pain of metastases from cancer of the breast.

Sexual Frigidity. In most women who have no sex desire, 25 mg. of testosterone propionate given hypodermically three times a week for four weeks will arouse the sex instincts. This may be due to the effect of the androgen on the clitoris.

In an occasional case of *uterine fibromyomas* where there is profuse bleeding and where an operation is not to be performed, 25 mg. of testosterone propionate given hypodermically 3 times a week for three or four weeks will stop the uterine bleeding. If the androgen therapy is continued, not only will the bleeding cease but the fibromyomas will decrease in size. Soon after the treatment is stopped, however, the fibromyomas will increase in size again. Hence, such therapy is only temporary in effectiveness.

Lactation may sometimes be suppressed by giving 20 to 25 mg. of testosterone propionate hypodermically daily for 3 days, or 100 mg. methyl testosterone by mouth daily for 3 days. Puerperal women do not often show signs of virilism, even when given large doses of androgens, just as they rarely have disagreeable side effects when they take diethylstilbestrol.

Caution must be exercised in administering
testosterone propionate as it has already
demonstrated that virilism (hirsutism,
in voice and slight enlargement of the c
can be induced in some women who
more than 250 mg. of this substance.[17]
wise, some women gain weight and de
an aceneform eruption. Most of these
agreeable side-effects disappear slowly a
the hormone treatment is stopped, but so
may persist f [illegible] months or longer. The
undesirable [illegible] androgenic therap
may possibl [illegible] d with the develop
ment of new [illegible] which may retain
the effectiven [illegible] one propionate
but not the [illegible] tivity of this
substance.

SUMMARY

The male hormone, testosterone, resembles the corpus luteum hormone, progesterone, in many of its physiologic effects, and on this basis, the androgen is being administered by some gynecologists to overcome certain gynecologic disorders. Testosterone propionate, a derivative of testosterone, is being used with considerable success in the following gynecologic disturbances.

In the menopause the male hormone should be used instead of the estrogens to overcome distressing symptoms in women who have had a breast or other organ removed for cancer, in women who have had pelvic endometriosis, and in women who bleed when they take estrogens. To produce relief from dysmenorrhea and painful breasts it is not necessary to give large doses because there is no need to suppress ovulation.

Not only may the dysmenorrhea associated with, and the constant pain due to, endometriosis be relieved by androgens, but also the endometriotic areas temporarily decrease in size. The androgens are almost a specific cure for premenstrual tension. In excessive uterine bleeding large doses of testosterone propionate must be administered in order to suppress ovarian activity completely. Some cases of Mittelschmerz or intermenstrual pain are benefited by small doses. Huge doses must be administered to produce relief from pain due to metastases from cancer of the breast. Sexual frigidity requires large doses.
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SOMMAIRE

L'hormone testostérone masculeu ressemble á l'hormone du corps jaune de l'ovaire, progestérone, sous beaucoup d'effets physiologiques, et se présente sur cette base. L'androgéne est employée par certains gynécologistes dans le traitement de plusieures affections gynécologiques.

Dans le ménopause, l'hormone mâle peut être employée au lieu de l'estrogéne dans le traitement des symptomes douloureux ches les femmes dont a emputé le sein ou fait l'ablation d'autres organes pour le cancer, aussi chez les femmes qui ont souffert d'endométriose pelvienne et chez les femmes qui saignent après avoir pris des astrogénes

Dans le traitement de la dysménorrhée et de seins douloureux, il n'est pas nécessaire de donner de fortes doses car il n'est pas indiqué de supprimer l'ovulation. Non seulement la dysménorrhée et les douleurs mammaires qui accompagnent l'endométriose sont controlée par les androgénes, mais aussi la superficie des plaques endométriotiques est diminuée temporairement.

Les androgénes sont presque spécifiques et curatifs pour la tension prémenstruelle Dans les hémorragies utérines excessives, il importe d'administrer de fortes doses de testorénone propionate afin de supprimer toute activité ovarienne. Certains cas de douleurs intermenstruelles cédent á l'emploi de petites doses. Il faut employer de grandes doses pour soulager la douleur dû aux métastases consécutives au cancer mammaire.

La frigidité sexuelle nécessite de fortes doses. Il est probable que les effets bienfaisants sont dûs á l'action des androgénes sur le clitoris. Dans les quelques cas d'hemorragie excessive dûes aux fibrimyomes utérins et oû il est sage d'ajourner l'opération, de fortes doses d'androgéne non seulement arréteront l'hémorragie mais améneront une réduction temporaire dans le volume du fibrome. Par rapport á la sécretion lactée, de petites doses d'androgéne auppimeront la lactation.

C'est avec prudence qu'on doit employer le testostérone proprionate parce que de fortes doses produisent le virulisme (hirsutisme, altération de la voie et augmentation de volume du clitoris).

Sous d'autres rapports, l'androgéne est un excellent tonique pour beaucoup de femmes.

RIASSUNTO

Il propionato di testosterone e' somministrato con notevole successo nelle seguenti disfunzioni ginecologiche: In menopausa, allorquando i disturbi funzionali insorgono in pazienti operate di carcinoma; allorquando figurino—nell'anamnesi—sintomi di endometriosi; oppure allorquando la somministrazione di ormoni estrogenici abbia provocato delle perdite di sangue dai genitali. In talune forme di dismenorrea o di sindromi dolorose della mammella. In questi casi la somministrazione di testosterone deve limitarsi a delle piccole dosi, in quanto non occorre una vera inibizione dell'ovulazione.

Se la dismenorrea e' associata o legata ad un'endometriosi, gli ormoni maschili trovano un'indicazione particolarmente utile, in quanto inibiscono lo sviluppo dell'endometriosi. Per eliminare la cosidetta "tensione" premestruale. In talune metrorragie funzionali. In questi casi la dose degli ormoni maschili deve raggiungere un livello tale, da sopprimere completamente l'attivita' ovarica. Nelle donne soggette a dolori intermestruali, dovuti allo scoppio dei follicoli ovarici. In questi casi gia' delle piccole dosi di testosterone rivelano una notevole efficacia.

Allorquando insorgano delle metastasi secondarie ad un cancro della mammella. In questi casi occorrono delle dosi molto elevate di testosterone per attenuare l'intensita' dei dolori.

Per ridurre la frigidita' sessuale. In questi casi gli ormoni maschili, in forti dosi, sembrano esercitare un'azione stimolante sopra il clitoride. In talune menorragie associate a fibromiomi dell'utero, nelle quali l'operazione deve essere posposta per qualche controindicazione. Larghe dosi di testosterone possono non solo frenare le emorragie, ma ridurre — almeno — temporaneamente—il volume dei tumori. Per sopprimere la secrezione lattea bastane delle piccole dosi di ormoni maschili.

La somministrazione di testosterone va sorvegliata attentamente onde evitare — specie allorquando si tratti di dosi elevate — l'insor-

genza di irsutismo, cambiamenti della voce, ed un aumento di volume del clitoride. Il propionato di testosterone e', daltra parte, un eccellente tonico per molte donne.

SUMARIO

La hormona masculina, el testosteron, resembla a la hormona del cuerpo luteo, la progesterona, en muchas de sus acciones fisiologicas y por esta razon se administra en ciertos desarreglos ginecologicos.

En la menopausia la hormona masculina se usa para corregir los sintomas que acarrea en las mujeres que hayan sido operados por cancer del pecho o de otra region, o que hayan padecido de endometriosis y por ultimo en las mujeres que tienen tendencia a sangrar del utero cuando se les administra productos estrogenicos. En el tratamiento paliativo de la dismenorrea y de la congestion dolorosa de los pechos. En estos casos no es necesario el dar doses elevadas para asi no suprimir la ovulacion. Las hormonas androgenicas no solo alivian el dolor de la dismenorrea y el que coexiste con la endometriosis sino que tambien disminuyen temporalmente el tamano de las regiones de la endometriosis.

La hormonas androgenicos son casi una cura especifica en el tratamiento de la tension premenstrual. En las hemorragias uterinas se deben de administrar doses elevades del propionato del testosteron para asi suprimir completamente la ovulacion. Ciertos casos de dolor intermenstrual se mejoran con pequenas doses.

En el cancer del pecho se deben de dar doses muy elevadas para controlar el dolor de las metastases.

En el tratamiento de la frigidez se deben de administrar doses altas. Su beneficio posiblemente se debe a su accion el clitoris. En ciertos casos de hemorragia uterina con fibromiomatosis del utero y en los cuales es necesario el postponer la operacion, doses elevadas de la hormona masculina no solo paran la hemorragia sino que muy frecuentemente traen la disminucion temporal en el tamano del tumor. Pequenas doses son efectivas en la supresion de la lactacion.

El testosteron se debe de administrar con cuidado por cuanto doses elevadas pueden producir el virilismo en la mujer. No obstante es un tonico excelente mara muchas mujeres.

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Suction Drainage Era in Surgery

RAFE C. CHAFFIN, M.D., F.A.C.S., F.I.C.S.
LOS ANGELES, CALIFORNIA

SEVERAL years ago in one of my earlier articles on this subject[1] I spoke of the beginning of the use of drainage and stated that the surgical literature would eventually be rewritten when drainage became available. The intervening years have shown that drainage as it is now accomplished has added a safety factor to surgery in many fields, aids in the reduction of mortality from surgical infection, and improves morbidity figures.

HISTORY

It is unfortunate that surgeons have not been more careful in the use of the word "drain" in surgery. I am unable to find the origin of the use of the word in surgical literature but it may have been used first in fields wherein the force of gravity was available, such as colpotomy. In the dictionary "drain" is defined as "to empty, draw out, remove or evacuate." On reflection, one is compelled to agree that in surgery gravity has been the only source of energy available to surgeons in the past. The laws of physics do not change. Some of these laws state that (a) fluids will not run "uphill" unaided; (b) fluid seeks its own level; (c) pressure of fluid is equal and the same in all directions; (d) hydrostatic pressure of a column of fluid is greatest at the lowest point and definite and measurable; (e) to create a column of fluid there must be a surrounding wall to support it and pressure on this wall is measurable. Accepting these physical laws as true, we may ask where, when, and how have we applied them to surgical fields, except when gravity was utilized.

"Capillary action" is so infinitesimal that its value has been nullified as has been proved by the gradual disuse into which wicks have fallen with the general surgeon. The statement from scores of surgeons that "I do not use drainage now as patients seem to get along just as well without it" is only too true. Since wicks never accomplish drainage the results could not be materially different. Wicks or vents are *not* drains. Webster's dictionary defines vent as "an opening to permit the escape of a fluid or gas" and a wick as "a device to maintain the permanency of the vent." Both of these are passive. Probably there are no surgeons today who have not at sometime in their lives been in contact with conditions or problems, whether on the farm, in the mine, the factory, the laboratory or the home wherein they were not confronted with the problem of draining something. The farmer puts a pump in his well to empty it; the engineer puts a pump in the cesspool to empty it; the oil worker puts a pump in the "sump hole"; the laboratory worker uses aspiration (suction) to withdraw fluid, the sailor uses a bilge pump to suck up fluid. No wicks (Penrose) were ever used in any of these fields. The *surgeon uses a wick in the cavity* with or without a preformed wall—"uphill"—and calls it a drain. It might be added that it is not a question of volume. The farmer wants volume, it is true, probably to water his stock. The surgeon is not so much interested in volume, but the fluid even in cubic centimeters is of sufficient importance that it may cause the loss or the saving of a life.

DEVELOPMENT OF SUCTION DRAINAGE

It is difficult to understand how a piece of gauze, rubber tissue or tube placed in a cavity pointing upward could be considered a drain. *It does not suck out or empty.* After much study of the problem I have never used the word "drain" when it applied to a passive structure. Because of that trend of thought I have been able to develop, with much outside help from colleagues and engineers, a method of drainage that drains. It is now available in hospitals throughout the world and with its use the mortality from infection should be appreciably reduced.

TECHNIC OF SUCTION DRAINAGE

Device to Accomplish Drainage. It is known that wicks permit an overflow only when the cavity is completely filled, and increase the area of infection a hundred fold or more by permitting it to spread in all directions, contaminating clean tissue and finally directing the infection into the incision and the wound itself. This, of course, is highly undesirable. What was wanted was a means of sucking out the infection from its source at the lowest existing level and thereby preventing the spread of infection. It is a well-known law of physics that fluid cannot be sucked out of a cavity or container (i.e., bottle with drinking tube) where air is not admitted. That is necessary in the surgical cavity. A suitable tube has been designed (Chaffin drainage tube) which permits free circulation of air by suction energy and no suction can occur on the eyelets of the tube and adjacent tissues. This can be demonstrated as outlined in Chart 1. After years of experimentation and study, we have

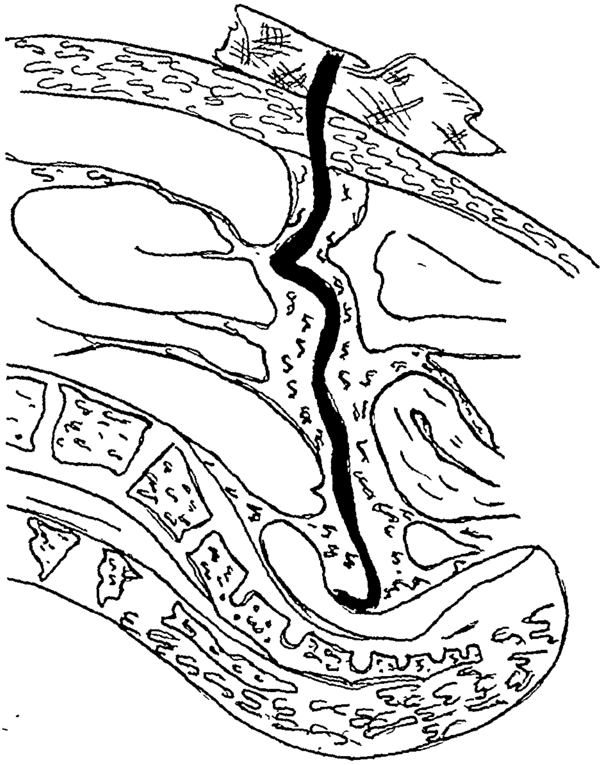
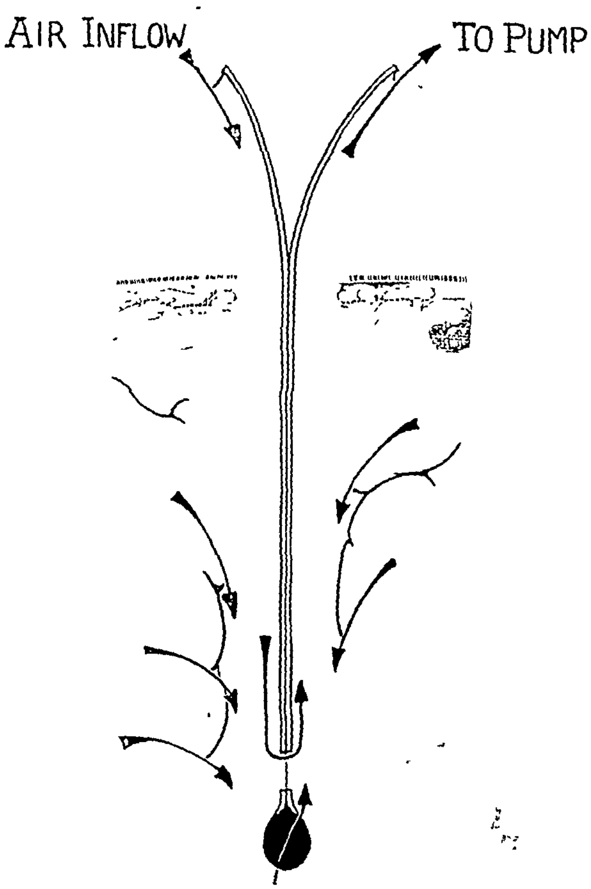


Fig. 1. This is to illustrate what a Penrose wick will *not* do in any abdominal cavity. Shaded area is collection of pus and serum flowing in every direction except "straight up." When the area is completely filled a small portion will overflow on the gauze. The area of infected tissue is increased many fold. This new infected area accounts for most postoperative temperature and sepsis. A suction tube in this cavity prevents new infection and removes all secretion from the bottom.



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(and patient) to assume the offensive at once, and recovery and healing begin immediately. In the peritoneal cavities (the field of greatest usefulness) few or no adhesions are formed, canalization or gross wound infection does not occur, and metastatic or secondary abscesses have not been observed. The drainage is often applied to the several reservoirs of the abdomen at the same time, as in general peritonitis in late ruptured viscera and pancreatitis (Fig. 4). Prophylactically it may be used to protect nearly all intestinal anastomoses, especially surgery of the large bowel.

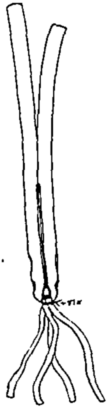

Fig. 2b. New type of tube now in use. Shows Penrose "tails" attached which direct fluid to "low point" to be sucked out. This type of tube drains a wide area of infection and increases effectiveness of the Chaffin tube in suction drainage.

Energy for Producing Suction. In a long struggle to find a source of suction energy, during which numerous devices were tried, including the "water bottle gadgets" as these are used today by the profession, none was found adequate to operate the Chaffin tubes. In this mechanical age they may all be considered as belonging to the horse and buggy era since they are all unscientific, impractical, inefficient, slow, and require constant nursing attention and are too frequently nonoperative.

Our engineers have developed an electric unit capable of doing all the things we find necessary and consider important: it is noiseless, trouble-proof, and constructed to operate two suctions (half gallon size collection bottles) at the same time. We are assured that the Chaffin tube will be kept in constant operation, permitting of no clogging, and with one bottle attached to the Levin tube, we are assured of a completely empty stomach, allowing the patient to drink any

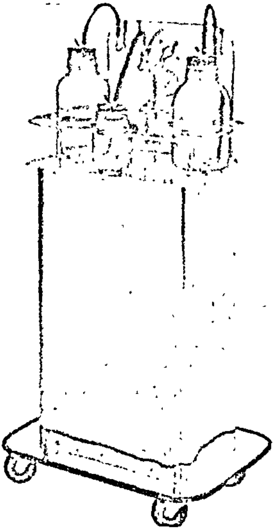

Fig. 3 Photograph of new bedside pump. Has two 2-quart collection bottles with negative pressure equal to 30 inches of water (2 inches of mercury) suction on each. We use one for nasal tube and other on Chaffin tube. If more Chaffin tubes are used we attach another pump. There is a small bottle for "high suction" for throat mucus. A gauge shows degree of suction at all times. The suction on the large bottle cannot be increased by nurse. There is an automatic "shut off" when bottles overflow. Constructed for continuous operation day and night for years without attention. Silent so it does not disturb patients in a ward.* This appliance competely covers the medical and surgical suction requirements of any hospital.

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* Manufactured by E. O. Pratt Company, Los Angeles.

amount of water, which he greatly enjoys. When he has drunk a half gallon of water, or less, the nurse empties the collection bottle. The Chaffin tube and Pratt pump comprise the two elements necessary to carry out this technic of suction drainage (Fig. 5). The surgeon need only place a tube in the surgical field, secure it to the skin with a silkworm suture and the nurse at the bedside will attach the pump (Chart 2).

CLINICAL APPLICATION

Below are discussed conditions and surgical fields in which suction drainage may serve to reduce serious complications and deaths, as well as lower the incidence of morbidity, shorten convalescence and lessen sequelae such as adhesions, chronic sinuses, and persistent fistulas.

Acute Cholecystic Disease. What is said here is not to be interpreted as a contro-

CHART 1. METHOD OF DEMONSTRATING THE CHAFFIN DRAINAGE TECHNIC WITH THE CHAFFIN TUBE

1. Obtain a tall drinking glass or similar glass container (wide mouthed glass bottle).
2. Insert a Chaffin tube to the bottom.
3. Pack one rubber glove well around the tube (do not kink the tube).
4. On top of this pack in gauze loosely.
5. Fill with water and you now have a closed abdominal cavity with intestines and omentum. The water is the peritoneal fluid, the gauze furnishes the secretion.
6. Apply suction to either limb of the tube and observe the complete emptying of the fluid from the gauze and from between the loops of intestines (glove). This is the peritoneal secretion and will be completely withdrawn in a few minutes (auto irrigation).

Water bottle suction gadgets will not operate this drainage as it is too slow. In the experiment use the operating room suction or a water faucet pump.

Mr. E. O. Pratt of Los Angeles designed a bedside pump as a source of energy for these tubes and I know of no other. This pump energy is just as necessary as the electrical or hydraulic suction in the operating room is to operate the Pool Tube or the tonsil suction.

Contrast this experiment with the same set-up with the Penrose Wick. Canalization (infection fibrosis) does not occur because the pus comes out through the tube and not around it as with a wick.

A single tube with suction will not operate because intestines are sucked into the end of the tube, causing damage and no removal of the fluid.

CHART 2. TECHNIC IN THE USE OF THE CHAFFIN TUBE IN SURGERY OF THE ABDOMEN

1. At surgery, place a tube in any cavity or reservoir wherein there is undesirable secretion, or where it may occur. This tube is to replace all Penrose or other wicks.

   Example: Place tube in

   1. All gallbladder surgery, in drainage of the gallbladder. Insert in gallbladder and "purse-string" in the usual manner.
   2. Below the gallbladder (duct surgery).
   3. Gastric resection (near duodenal stump in case of leakage and to prevent subdiaphragmatic and other infections in this area.
   4. Pancreatitis (a) gallbladder, (b) lesser cavity, (c) pelvis, (d) right gutter.
   5. Appendix abscess and pelvis, if questionable infection of this field (most important).
   6. Urinary bladder, to keep empty and dry. Urinary bladder and outside if traumatic rupture.
   7. All other fields that require drainage (uphill).
   8. Protects all fields of colon surgery, resection or anastomosis.

2. Close wound tight up to the tube. We usually exit the tube through stab wounds and not incision.

3. Suture tube to skin with silkworm and tie in bowknot.

4. Test both limbs of the tube with operating room suction before leaving operating room. Leave ends of tube outside of dressing.

5. Attach Pratt Pump or other large volume low pressure suction to one limb of the tube at bedside for continuous suction with Murphy drip can to other limb and slow drip of sodium chloride.

6. In 24 to 48 hours untie the bowknot and loosen tube, pull up a little and replace. Air entering tube is disregarded, even in clean cases, as no infection will occur.

7. There will be no need for further attention for the duration of drainage (2 days to 2 weeks). The average abscess of appendix requires about 5 to 7 days.

8. Use small dressing on abdomen so tube can readily be inspected for kinks, etc.

9. Dressings will not be soiled and wound not grossly infected. In 2 or 3 days drainage cases the "drip" is not required, if you change suction from limb to limb to prevent dryi

versy between drainage and cholecystectomy. Rather, this may be considered a form of treatment of the acutely ill patient to save his life and prevent complications, thereby greatly reducing the mortality of this disease. Cholecystectomy can always be done at a future time.

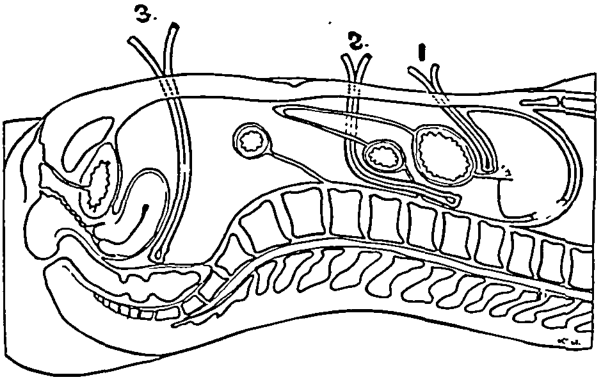

Fig. 4. Shows location of suction drainage tubes in draining abdomen with acute pancreatitis. (1) liver space, (2) lesser peritoneal cavity, (3) pelvic drain. Suprapsoas reservoir may also be drained by other tubes through stab wounds if these are found to contain peritoneal fluid. One limb of each tube is attached to pump for suction.

The acute gallbladder should be opened aseptically with trocar and contents aspirated, stones removed and a Chaffin tube inserted. A second Chaffin tube should be inserted below the gallbladder. If the gallbladder becomes gangrenous and sloughs away completely, nothing will happen to the patient because all secretion is controlled with Chaffin tubes and no peritonitis (chemical or bacterial) will result. This early surgery will almost entirely prevent the deaths from ruptured and gangrenous gallbladders. The slightly damaged gallbladder will recover earlier and more completely with suction drainage because it is kept entirely empty at all times and the mucous membranes may make an early recovery.

Chronic Cholecystitis. In all cholecystectomies a tube should be placed near the gallbladder bed for 24 to 72 hours. All cholecystectomies leak bile (Frank H. Lahey,[3] Arthur Allen[4]). How much bile leakage occurs may be learned through suction drainage. We obtain 50 to 150 cc. of highly colored serum from every gallbladder field. Suction drainage prevents the local bile peritonitis which occurs in cholecystectomy with nondrainage or when wicks are inserted. We formerly tried wicks or closures but now protect all with a Chaffin tube (Fig. 2b).

Biliary Passages. In all duct surgery there is bile leakage and such cases should be protected with suction drainage. A wick stimulates serum secretion, mixes it with bile and after it fills Morrison's pouch a little will come out into the incision (to impair healing) and appear on the dressing. This is not drainage, but an overflow.

Liver Abscess. Hepatic abscesses should be drained as soon as diagnosed. Pus should be evacuated aseptically with trocar and Pool tube and Chaffin tube inserted to achieve a continually empty cavity and early recovery (Fig. 6). The avenue of approach is not important because the surgery is aseptic and there is no danger from the "spill," a condition always present with the overflow passive type of attempted drainage. Several cases recently reported by Bean[5] were treated with this technic with prompt early recovery. No contamination of the peritoneum occurred and liver repair took place early because of a completely empty cavity from the moment of its evacuation till healed.

Pancreatic and Duodenal Resection. This is a very important field for drainage as we are dealing with duodenal secretion, pancreatic enzymes and bile. An operation well done with multiple anastomoses cannot always give the best results and may result in complete failure if the chemical peritonitis prevents the healing of suture lines. Suction drainage may serve to insure against this eventuality by removing all fluid and leaving the suture line dry instead of submerged in a pool of serum. If leakage occurs, it will be directly into the suction bottle.

Gastric Surgery. Two dangers in the field of gastric surgery are from suture leakage and from subdiaphragmatic infection. The duodenal "blow-out" has always been a menace and a danger. When it occurred, death usually resulted from bile peritonitis. The anastomosis leak at the upper angle is also a critical point and this results in a subdiaphragmatic infection or worse. A suction tube placed in this field for five or six

[illegible]

[illegible]

Large Bowel. Since the advent of sulfonamide compounds as bacteriostatic agents the technic of colon surgery has improved to the point where one-stage resection is common. The best technic and skill will not prevent the occasional leak due to tissue necrosis of vessel thrombi, and when it occurs the result is either a fatal peritonitis or a large abscess with a fistula. Protect these anastomoses with two tubes for a few days and the patient's safety is assured. With the use of suction drainage we have done *both right and left one-stage resections* for over 20 years. Exteriorization technics which formerly were employed to avoid infection may be rendered unnecessary when the hazard of infection is eliminated.

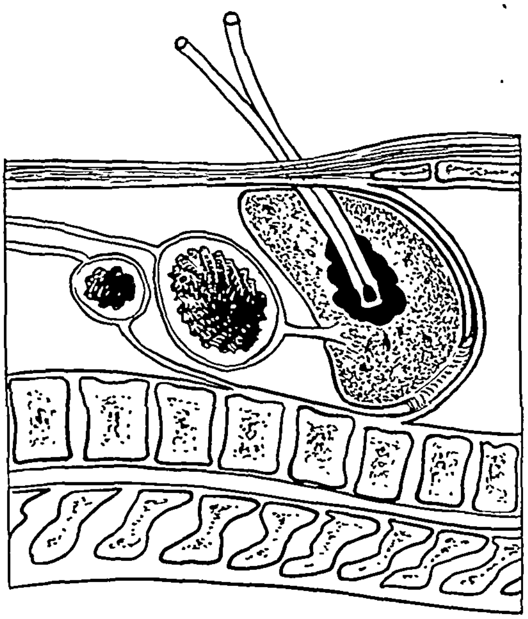

Fig. 6. Placing a Chaffin drainage tube in liver abscess especially indicated because the direction is "up-hill" and this tube permits of no leakage or contamination of peritoneal cavity.

Small Bowel. Anastomosis of the small bowel is a much safer procedure than anastomosis of the large, but leakage does occur and we often protect these with a tube.

Appendicitis. The overall mortality in appendicitis continues much too high, though large surgical centers individually have reduced the mortality. All the peritoneal cavity wants from the surgeon is a little help in taking out the gross infection and the patient will do the rest. Since the institution of suction drainage in our hospital for one year our mortality in appendectomies has been zero. In the case of ruptured appendix with abscess, the pelvis should nearly always be drained as well as the right gutter and at times Morrison's pouch in the case of high abscess. Two tubes are an average and three are not too many.

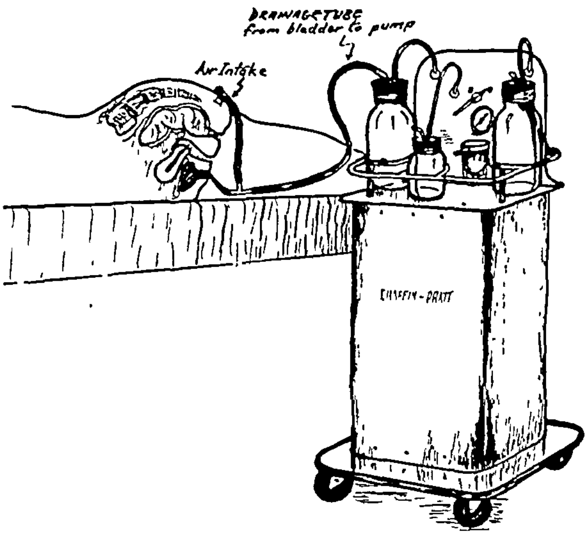

Fig. 7. Catheter in place with tube over thigh to prevent kinking; "T" tube to admit air. Suction should not stop during entire postoperative treatment (about ten days).

Pelvic Infection. Abortion or other acute infections of the pelvis, formerly so dangerous, will usually improve with chemotherapy. Those who do not yield to chemotherapy in 48 to 72 hours should have a suprapubic Chaffin tube inserted down to the bottom of the pelvic cavity. Recovery usually may be expected in a few days. Many cases of the gonorrheal type of infection yield to chemotherapy but abscess formation is not uncommon. These should be drained early per abdomen by a Chaffin tube.

Genitourinary. All bladder surgery comes into the field of suction drainage, including vesicovaginal fistula.[2] Complete drainage of the bladder after repair of vesicovaginal fistula as outlined by me some 25 years ago has completely revolutionized the technic. With adequate drainage (first with the Bradford frame as originally reported by me and now with suction and the "frame" eliminated

(Figs. 7, 8, 9)) the percentage of cures is very high. All suprapubic bladder surgery requires suction drainage for the best results Water will not run "uphill" Any bladder that has been sutured is definitely safer if it contains no urine at any time than one that is full and "running over" as is always the case in single-tube drainage, the incorrectly-called siphon. For the past 20 years we have used suction drainage in suprapubic prostatectomies and always have *dry* patients with early closure. The new subpubic or retropubic case also heals more kindly and earlier and remains dry with suction drainage. Rupture of the bladder either into the peritoneal cavity or pericystic tissues is not a serious problem. Two tubes, one in the repaired bladder and one in the abdomen or tissues will assure an early healing. The *sutured bladder cannot leak if it contains no fluid.* Serum secretion will wash out extravasated urine if we will remove it.

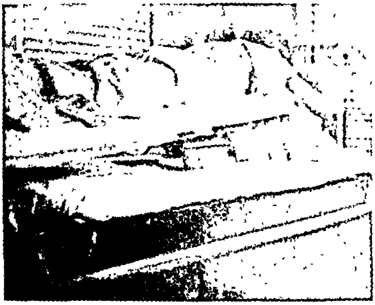

Fig. 8. Photograph shows patient on Bradford Frame with catheter dropping down into pan for a completely empty bladder. Bradford Frame no longer necessary. Patient placed on face in bed and Pratt suction pump and "T" tube arrangement produces better drainage and greater comfort.

Ureters transplanted to the sigmoid should be protected with one or two tubes to prevent peritonitis in cases of suture leakage or gas "blow-out." I have seen both occur with this tube protection and the fistula closed in five days.

Kidney Surgery. All surgery of the kidney pelvis and ureters should have the protection of suction drainage because urine is very irritating to the tissues and invites infections. The direction is "uphill." The Chaffin tube will keep the interior of the wound dry and permit no extravasation. *All* urine (in pelviotomies) is collected and the amount of leakage is therefore known day by day. This is not possible where vents with wicks and dressings absorb the "overflow."

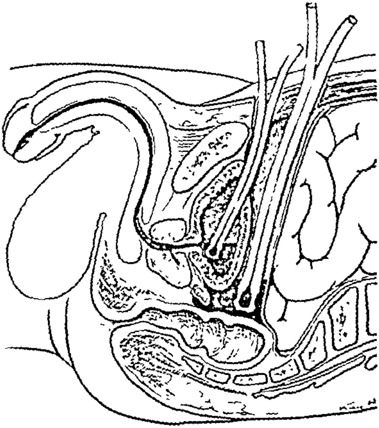

Fig. 9. Use of suction tube in bladder injuries or resection done for any purpose—as posterior diverticulae. One tube keeps bladder entirely empty so no leakage of suture-line can occur, and other is in posterior perivesical space, preventing any infection or extravasation in this most dangerous territory. If rupture has occurred into abdomen, the peritoneal pelvis would be drained by another tube.

There are many other fields of surgery where suction drainage is applicable but I have mentioned a few of the common and most important ones and those in which the mortality and morbidity can be greatly reduced. The disuse of wicks of any sort and the substitution of drainage is rapidly changing the whole conception of what surgical drainage means.

SUMMARY

Drainage has been defined and its mechanics and physics explained. It has been shown that wicks do not drain and will not cause fluid to flow "uphill." The use of drainage has greatly reduced the number of deaths occurring in any hospital where the technic is used and the equipment is available. The technic has been so simplified that any operator of limited experience can do as safe an operation in infected fields as the better trained surgeon. Visceral leakage is a hazard to surgery and drainage will guard this type of surgery. Earlier recovery will be the rule when drainage is used as compared with closures or vents.

Economy is an important factor as few dressings are necessary with suction drainage since all secretion is in the bottles. Wounds are not grossly infected as all secretion comes through the tube, not around it. Adhesions are less because the area between the infection and the surface is not grossly contaminated.

An improved type of Chaffin tube is now in general use which increases the area drained and the general efficiency of the tube compared with the original one.

CONCLUSIONS

We have shown that wicks and vents are not drains. We have described a simple efficient method of accomplishing real surgical drainage that was not heretofore possible. The more important fields of surgery have been described as well as the method by which the therapeutic and prophylactic use of drainage can be applied to these fields. Mortality is greatly reduced—probably 90 per cent—by use of drainage. Morbidity has been greatly
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Recovery and healing are the
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SOMMAIRE

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SUMARIO

Hemos mostrado que los drens de mecha no ofrecen verdadero drenaje. Se ha descrito un metodo muy simple y muy eficiente de drenaje quirurgico. Con el la mortalidad se ha reducido por lo menos un 90%, lo mismo que la morbilidad. Hemos tambien demostrado que el recobramiento es dependiente del proceso
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Italy—Mother of Medicine*

HIPPOCRATES, as is well known, has been called the Father of Modern Medicine in recognition of his establishment of medicine as a science based on observation of disease and a careful recording of its manifestations in the human body. The transfer of the center of medical advancement from Greece to Rome was the result of the development in Italy of leaders who created a new epoch in medical progress.

Today the name of Vesalius, who studied in the scientific atmosphere of Italy, is recognized universally as the father of anatomy, a subject among the most important of the basic sciences upon which modern medicine has developed and grown. William Harvey, known for his basic research on circulation of the blood and recognized as one of the ten greatest names in medicine of all time, was an Englishman imbued with the spirit of medical science and research in the school in Padua. As economic and social conditions have changed, the center of medical research and advancement has changed with them, but regardless of political, social or economic vicissitudes, the spirit of investigation and research has remained alive in Italy, and Italian scientists have contributed notably and continually to medical advancement. The name of Forlanini as the creator of pneumothorax is one of the most significant in the record of our progress against tuberculosis The genius of Bastianelli and Putti has been everywhere recognized for their contributions to surgery and particularly to rehabilitation and reconstruction of those disabled by accidents, by injuries, and by wars.

Today Italy has been considered especially appropriate as a place for the meeting of international congresses because of its traditions of scientific medical advancement in the past and equally because of the manner in which its medical institutions have survived two recent devastating wars. The contributions to gynecology of Emilio Alfieri and the work of the Cancer Institute in Milan have attracted medical recognition. From less well known Udine came operations on the spinal ganglia by Pieri. The universities in Rome, Milan and Trieste still continue to attract great numbers of visitors who are interested not only in contributions to modern medical science but also in the background of culture and medical tradition which make all of Italy a shrine for the medical visitor.

The death of the renowned surgeon, Professor Mario Donati, was recognized throughout the world as a major loss to medical progress and the American medical profession has expressed interest in the development of the library established by the Donati Foundation as a center for the preservation of his own collection of books and periodicals and for contributions from other nations to aid the creation of a center where medical studies may be carried on.

In Italy, Antonio Carle (1854–1927), a pupil of Billroth, did valuable work on the brain, the thyroid, the gastrointestinal and biliary tracts, but was still more important for the influence that his school at Turin had on the general progress of Italian surgery. Among Carle's distinguished pupils were R. Gallazzi, director of the orthopedic clinic at Milan; M. Donati (1879–1946) of Milan who contributed to advances in surgery of the parathyroids, the abdomen and the sympathetic nervous system; and O. Ufreduzzi of Turin who wrote on peripheral sympathectomy and hermaphroditism, and also G. M. Fasiani of Milan, eminent as a brain surgeon. A. Carle in 1882 demonstrated the transmissibility of tetanus.

Genius is not the exclusive property of any nation, of any race or of any creed. Wherever it arises it deserves the support of all mankind. The contributions of Italy have benefited the world as a whole and the great debt that the world owes to these geniuses of Italian medicine for their contributions must be acknowledged.

MORRIS FISHBEIN

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* Presented at the Sixth International Assembly, International College of Surgeons, Rome, May 18–24, 1948.

that wicks do not drain and will not cause fluid to flow "uphill." The use of drainage has greatly reduced the number of deaths occurring in any hospital where the technic is used and the equipment is available. The technic has been so simplified that any operator of limited experience can do as safe an operation in infected fields as the better trained surgeon. Visceral leakage is a hazard to surgery and drainage will guard this type of surgery. Earlier recovery will be the rule when drainage is used as compared with closures or vents.

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Recovery and healing are dependent on the physiologic process of tissue secretion (auto-irrigation) and healing is active and progressive from the hour of surgery if the secretion is sucked out.

SOMMAIRE

Nous avons démontré que les mèches et les tubes ne sont pas des drains. Une méthode très simple et efficace pour obtenir un drainage vraiment chirurgical qui jusqu á present n'était pas possible vient d'être décrite. La mortalité est grandement diminuée, probablement de 90% par l'emploi du drainage. La morbidité aussi est diminuée par l'emploi de la technique Chaffin. Le drainage chirurgical doit obtenir la suction constante du fluide des cavités affectées. Nous avons démontré que le traitement et la guérison dépendent sur le procédé physiologique de secrétion tissulaire (auto-irrigation) et la guérison est consécutive et progressive, si dès le commencement le drainage par suction peut être appliqué. Dans le cholecystite aigüe et chronique, dans les abscès hepatiques, dans les affections biliaires, dans les résections pancréatiques et duodénales et dans la chirurgie de l'estomac de l'intestin grêle et du gros intestin, de l'appendice, des infections génito-urinaires et des maladies rènales, on aura recours à cette méthode.

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Hemos mostrado que los drens de mecha no ofrecen verdadero drenaje. Se ha descrito un metodo muy simple y muy eficiente de drenaje quirurgico. Con el la mortalidad se ha reducido por lo menos un 90%, lo mismo que la morbilidad. Hemos tambien demostrado que el recobramiento es dependiente del proceso fisiologico de secrecion de los tejidos (auto-irrigacion) y que los procesos de regeneracion y de reparacion son activodos desde el momento que se comienza la succion de las secreciones. El tratamiento de drenaje por succion es de valor en la cirugia de las vias biliares, abcesos del higado, en las resecciones del duodeno y del pancreas, en la cirugia del estomago intestinos y colon, y en las infecciones genito-urinarias.

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Jones and Dr. Albert E. Casey, Birmingham, Alabama; Dr. J. U. Reeves, Mobile, Alabama.

Sir Archibald McIndoe, plastic surgeon of London, England, attended as the guest of Dr. James Barrett Brown. Sir Archibald contributed an interesting discussion of the panel system as practiced in England. Dr. Kenneth Cuyler of Duke University, guest of Dr. F. Bayard Carter, spoke on "Cytologic Diagnosis of Cancer."

The meeting was well attended, with 166 registrations, and again as many who did not register.

The afternoon meeting was followed by an interesting tour of the Southern Research Institute of Alabama. In the evening a banquet at the Tutwiler Hotel was attended by about 120 guests.

The program was concluded with a very interesting and educational lecture by Dr. William Dameshek on "The Spleen and Hypersplenism."

The first annual meeting of the *Wyoming Section* was held in Laramie, Wyoming, on August 31, 1948. Headquarters and registration were at the Connors Hotel.

Officers of the Wyoming section are:

President.............Dr. H. L. Harvey, Casper
Vice-President..........Dr. V. R. Dacken, Cody
Secretary-Treasurer..Dr. L. S. Anderson, Worland
State Regent..Dr. W. Andrew Bunten, Cheyenne

Committee on Arrangements was:

Dr. Lee W. Storey, Laramie
Dr. J. D. Shingle, Cheyenne
Dr. Herbert L. Harvey, Casper
Dr. W. Andrew Bunten, Cheyenne

Program

9:00 A.M.: Registration.
10:00 A.M. to 12:00 Noon: Dry Clinics presented by members of Albany County Medical Society
12:15 to 1:45 P.M.: Luncheon.
2:30 P.M.: Hyperparathyroidism, by Dr. B. Marden Black, Mayo Clinic, Rochester, Minnesota.
3:00 P.M.: Hirschsprung's Disease, motion picture presentation, by Dr. Max Thorek, Chicago, Illinois.
3:30 P.M.: Anomalies and Pathology of the Gallbladder and Bile Ducts with moulage demonstrations, by Dr. Nolie Mumey, Denver, Colorado.
4:00 to 4:30 P.M.: Discussion of all papers.
4:30 to 5:30 P.M.: Business meeting and election of officers for the coming year.

A smoker was held in the evening in conjunction with the Wyoming State Medical Society.

The Spring Clinical Conference of the *New Jersey Section* was held on Wednesday, May 19, 1948, at Jersey City Medical Center.

Officers:

Dr. John J. Connolly, President.
Dr. Watson B. Morris, Regent.
Dr. Charles M. Robbins, Vice-Regent.
Dr. Theodore Bender, Vice-Regent.
Dr. David Allman, Vice-Regent.
Dr. Earl J. Halligan, Vice-Regent.
Dr. Ernest F. Purcell, Vice-Regent.
Dr. Frank S. Forte, Secretary.

Program

10 00 to 11:00 A.M . Registration and inspection of the Jersey City Medical Center.
11.00 to 12:00 Noon. Inspection of Pathological Museum.
12 00 Noon to 1:00 P.M.: Luncheon at Bruno's.
1.30 P.M.: The So-called Harmless Gallstone, by Dr. Edgar Burke, Chief Surgeon, Jersey City Medical Center.
2:00 P.M.: Total Gastrectomy in Carcinoma of the Stomach, by Dr. Earl J. Halligan, Consulting Surgeon, Jersey City Medical Center.
Splanchnic Anesthesia in Gastrectomy, by Dr. Norman Kornfield, Anesthetist, Jersey City Medical Center.
2:45 P.M.: Endometriosis with Case Review, by Dr. Charles B. Kelly, Consulting Gynecologist and Director of Surgery, Jersey City Medical Center.
3:30 P.M : Volvulus of the Small Intestines in the Newborn, by Dr. Kenneth Judy, Attending Surgeon, Jersey City Medical Center.
4:15 P.M.: Comments on Meig's Syndrome, by Dr. Edward F. Sciorsci, Attending Surgeon, St. Francis Hospital, Jersey City.
5:00 to 6:00 P.M.. Cocktail Hour at Bruno's.
6:00 P.M.: Dinner at Bruno's.

New Books

British Surgical Practice. Edited by Sir Ernest Rock Carling and J. Paterson Ross, with a staff of consultant and associate editors, London, Batterworth & Co., St. Louis, C. V. Mosby Company, vol. III, 1948. The first two volumes of this series were reviewed in the October, 1948, issue of this *Journal*. The same general remarks are equally applicable to this volume. The subject matter ranges from Caesarean Section to Eyelids, and is handled in a comprehensive and crisp manner.

Five further volumes will complete this series which will represent a valuable compendium of surgical information.

A Short Practice of Surgery. By Hamilton Bailey and R. J. McNeill Love. Part Two. London, H. K. Lewis & Co., 1948. Current difficulties in England have unfortunately necessitated the piecemeal publication of the eighth edition of this concise, British, classic work. The overwhelming favorite of British medical undergraduates, it is gradually increasing in popularity in America as a general textbook of elementary surgery. This popularity is deserved, for the book has been written by two of England's most famous teachers of surgery and into it they have poured the fruits of their tremendous personal experience. Shorn of verbosity, the subject matter is presented succinctly and lucidly and the style is warm and personal.

Part Two deals with the gastrointestinal tract, including the pharynx and peritoneum, and excluding herniae. Each topic is handled in a concise, yet comprehensive manner, and where necessary, it has been thoroughly revised and brought up to date. The chief usefulness of the work is to serve as a vade mecum for the student, and as a quick source of reference to the practitioner who occasionally performs surgery.

Surgery of the Colon and Rectum. By Sir Hugh Devine and John Devine, Baltimore, The Williams & Wilkins Company, 1948. It is growing increasingly evident that the current trend in medical literature veers in the direction of the monograph. This is perhaps the natural outcome of the detailed knowledge that specialization has brought about. Only in a book whose range of topics is rigidly curtailed can the subject matter receive the meticulous consideration that its clinical importance may warrant. This is particularly true where there is but a single or perhaps two authors. Otherwise, the only alternative is to prepare a text written by a host of eminent collaborators, each a specialist in his chosen field. The final result is, of course, an aggregation of separate monographs, each being subservient to some editorial master-plan. Such a system is undeniably very useful, but the smaller, single monograph is becoming ever more popular with the medical profession.

In this connection the Doctors Devine have brought out a work which deals with a subject of paramount surgical importance: the large bowel, from cecum to rectum. The authors have dealt with their topic in a most comprehensive manner, stressing the urgency of early diagnosis, and choice of safer surgical procedure in any given instance. They base their opinions largely upon their own vast personal experience, although their conclusions are in agreement with surgical opinion both here in America as well as in England. The text can therefore be taken as authoritative. Indeed the senior author has already made an indelible impression upon modern surgical teaching.

To anyone interested in an exhaustive account of the surgery of the large bowel and rectum, this book is unreservedly recommended.

Traitement Chirurgical du Cancer du Rectum. By Francois D'Allaines. Paris, Editions Médicales Flammarion, 1946. This French book is an excellent monograph on surgical therapy of rectal malignancy, with a strong plea for the employment of the sphincter-preserving procedures whenever possible. The material is based largely on the author's personal experience, but he has made ample reference to workers from other countries. Of particular interest is the able rebuttal that d'Allaines provides to W. B. Gabriel's objections to conservative resections.

The serial illustrations depicting the various operative methods are excellent and the analytical tables are clear.

This work is yet another example signifying the rising tide of European medical progress freed from the harassing effects of war. It is highly recommended for the general surgeon as well as for the specialist.

Textbook of Surgery. By Frederick Christopher and contributors, Ed. 4, Philadelphia, W. B. Saunders Company, 1947. This well-known work is perhaps the most representative book on American surgery that one could find. The authors are culled from every part of the country, and their reputation and ability give unquestionable authority to their contributions.

The book has been designed primarily to impart the principles of surgical practice to medical undergraduates. The authors have achieved their goal with eminent success, since they have covered the entire range of surgery in a most comprehensive manner. Operative technic is not included in the discussion, however, and surgical therapy is only briefly outlined.

The really serious drawback to such a large work as this is that by the time the book reaches print, some portions are already outmoded, and recently developed items of incontestable importance have been omitted. Thus this edition contains no account of vagotomy, retropubic prostatectomy, the Rh factor, cardiac surgery, portocaval or lienorenal shunts and streptomycin, to mention only several of the more obvious omissions.

Nonetheless the reviewer regards this text as the best of its kind on the market, after making due allowance for its unavoidable limitations. It is recommended as a teaching text to all medical students, and as a compendium of ready reference to more advanced workers.

Textbook of General Surgery. By Warren H Cole and Robert Elman, Ed. 5, New York, D. Appleton-Century Company, Inc., 1948 The appearance of the fifth edition of this excellent work since its inception 12 years ago will readily attest to its value and popularity. While primarily designed for the medical undergraduate, the general practitioner and even the surgical specialist could well profit from a perusal of the text The roster of contributing surgeons contains names which are outstanding in contemporary American surgery

The general plan of the earlier editions has been preserved, but much new material has been added and the remainder revised, in some instances quite extensively. Operative technic has been held to a minimum, while emphasis is laid upon the underlying principles of surgical practice which in turn devolve upon a thorough knowledge of physiology and pathology. New, relatively untried surgical procedures are omitted.

There is fresh material on emergency surgery, chest surgery, pre- and postoperative management, nutrition, parenteral medication, etc.

A criticism which might be levelled against such a uniformly excellent book is the quality of the illustrations. They are uncolored photographs or drawings, of small dimensions, and are not always reproduced with great clarity Moreover, their total number is somewhat scanty, considering the scope of the text.

Textbook of Surgical Treatment. By C. F. W. Illingworth and contributors, Ed. 3, Baltimore, The Williams and Wilkins Company, 1947.

Few changes have been made since the last edition except to include new material on protein hydrolysates, the Rh factor and anticoagulants. In addition, new chapters on faciomaxillary injuries, plastic surgery, rehabilitation, and the use of penicillin in surgery have been included.

As is typical with most of the British texts, the book is impeccably written. The illustrations are not profuse, but adequate, and are clearly reproduced. The range of material is wide, including most of the topics that might reasonably be expected in a textbook of surgery.

It must be clearly recognized, however, that this is essentially an elementary work and will find its greatest sphere of usefulness as a teaching text for medical students. It is clear that British practice differs in many respects from that in this country. For example, the author favors the local application of sulfa-emulsions to burns, whereas such therapy has long been abandoned here. Another case in point is subtotal thyroidectomy. The technic described by the author would find small favor in most of our clinics.

Surgical Pathology. By William Boyd, Philadelphia, W. B. Saunders Company, 1947. For almost 25 years this worthy text has held almost undisputed reign as the standard reference book on surgical pathology for students and surgeons alike. Anyone familiar with the contents will readily understand why this is so, because in these pages teaching is first and foremost.

Using a writing style of great simplicity, Boyd has achieved a masterly, learned presentation. Some have objected to the dogmatic conclusions drawn by the author. While this might be out of place in a book of philosophy, for instance, it is most certainly appropriate in a didactic text. How else can the beginner build a solid foundation upon which to house his knowledge? Inconclusive ideas, nebulous theories, or frank guesses are hardly calculated to instil certainty in the student's mind. The author is keenly aware of this, and herein lies the secret of Boyd's success as a teacher.

The subject matter has been only slightly altered since the 1942 edition except for the following additions: cardiac anomalies, Bittner's milk factor, the Papanicolaou technic, pinealoma, and miscellaneous conditions.

The drawings are good, the microphotographs are excellent, and the colored reproductions are little short of beautiful.

While this book can be recommended to anyone interested in the subject, it is particularly useful for the candidate undergoing preparation for examination in general surgery sponsored by the specialty boards.

Minor Surgery. By Frederick Christopher, Ed. 6, Philadelphia, W. B. Saunders Company, 1948. In the 20 years that have elapsed since Christopher first wrote Minor Surgery, a gradual but *perceptible evolution has taken place in the contents of the succeeding editions until finally the material* presented in the present edition may truly be spoken of as major surgery, despite the modest title and the absence of such formidable procedures as abdominoperineal resections.

The contents of Minor Surgery are already so well known to most of the surgical world that they require but little elucidation. Suffice it to say that the new material includes discussions on hemostatic agents, sympathetic blocks for phlebitis, intraarterial penicillin for gangrene of the extremities, refrigeration anesthesia, etc. Moreover, there has been extensive revision of such topics as chemotherapy, antibiotics, phlebothrombosis, thrombophlebitis, and anticoagulant therapy, as well as prophylactic vein ligation, burns, skin grafting, and other subjects too numerous to mention.

The author has dealt with his subject in a comprehensive manner, and has ably maintained the general excellence that prevailed in the earlier editions. The quality of the illustrations is disappointing, however, since they are too small, without color, and the radiographs have been poorly reproduced.

Minor Surgery. By R. J. McNeill Love, Ed. 3, London, H. K. Lewis & Co., Ltd., 1948. Most general practitioners or surgical internes who are recent graduates are tolerably familiar with the basic principles of general surgery. But they are frequently bewildered as to the optimal procedure when confronted with injuries of a so-called minor nature. McNeill Love's book offers precise, factual, and practical information, so that proper therapy can be promptly carried out.

That the surgical neophyte has found this book most acceptable is evidenced by the printing of the present edition, its third in eight years—ample proof of its popularity in England. The newcomer in surgical practice on this side of the water would be similarly well-advised to avail himself of the sound precepts of this well-known English teacher.

Emergency Surgery. By Hamilton Bailey, Ed. 6, Parts I & II, Bristol, John Wright & Sons, Ltd., 1948. This work has been a great favorite in England for 18 years, and has enjoyed no small measure of success in America.

Emergency Surgery is much more than its modest title implies. Actually it is a textbook of practical surgery. Into it has gone Bailey's tremendous surgical experience with meticulous attention to detail.

Part I deals with transfusions, shock, resuscitation, anesthesia, exploration of the abdomen. A discussion of various acute abdominal conditions, begun here, is carried over into Part II, which ends with a final section devoted to hernia. The material is up-to-date, has been extensively revised, and is presented in Bailey's inimitable literary style.

It is most regrettable that publication difficulties in England have necessitated the release of the work in five parts, three of which still await issue. If the remaining volumes live up to the standard set in the earlier parts, Emergency Surgery will hold a most valued spot in the bookshelf of anyone connected with the practice of surgery.

Essays on Historical Medicine. By Bernard J. Ficarra, New York, The Froben Press, Inc., 1948. Occasionally, there falls to the lot of the reviewer the rare opportunity of reading and enjoying an unusually good book. The handful of essays comprising this short work on medical history is just such a book, for it provided one and one-half hours of delightful, instructive and entertaining reading.

If for no other reason, this book should be read by every medical man because it at least provides a background against which an intelligent discussion of medical history may be carried on. Further, it may serve to stimulate interest in that fascinating subject and prompt the inquirer to delve into the more standard classics, such as Castiglioni or Garrison.

The subject matter includes a wide range of topics, running the gamut from American pioneers in surgery to famous historical autopsies. Regardless of what part of the book the reader's eyes chances upon, he will there find enough matter of sufficient interest to hold his attention until the end of the essay.

Victor Robinson Memorial Volume: Essays on History of Medicine, New York, The Froben Press, Inc., 1948. As the subtitle implies, this is a volume of short essays on various aspects of historical medicine. Originally intended as a birthday volume in honor of Dr. Victor Robinson's sixtieth anniversary, by virtue of one of life's grim ironies the book has instead become a memorial volume, for Robinson died prior to the publication of the work.

Under the senior editorship of Dr. S R. Kagan, thirty-eight separate contributors have written fascinating short papers devoted to medical lore. The result is a treasury of engrossing literature.

The work is prefaced by letters of tribute from two eminent medical historians, Sigerist and Castiglioni, whom Robinson was largely instrumental in introducing to American medicine. The essayists proper have produced a work of uniformly high caliber.

The reader is referred to four obituaries which appear at the end of the volume, all written by close acquaintances, for a glimpse into the character of the man who, with the possible exception of Garrison, has done more than all others in making the medical profession in America conscious of the rich medical past.

The book has been issued in a limited edition, and should be an excellent addition to the libraries of those interested in historical medical classics.

Fielding H. Garrison: A Biography. By Solomon R. Kagan, Boston, Medico-Historical Press, 1948. Among contemporary medical historians, Kagan may perhaps be classed as one very conversant with the life and works of Garrison, and therefore eminently qualified to undertake the task of writing his biography. This small volume is, in effect, a sequel to the author's many earlier publications on Garrison.

The subject matter contains a wealth of information on Garrison's lineage, student days, army career, and final settling in Baltimore, up to the time of his death in 1935. The material is well-authenticated, with numerous references to actual letters, and to hitherto undisclosed information released by living relatives. An interesting evaluation of Garrison's work, by his friends, is included in the Appendix.

In reading this book it becomes clear that the biographer had a particularly difficult task since Garrison's life does not lend itself particularly to biography. Garrison led the secluded existence of a retiring scholar, utterly devoid of dash or glamour, and the true greatness of Garrison lay in his creative works.

Medical Writing. By Morris Fishbein, Ed. 2, Philadelphia, The Blakiston Company, 1948. The second edition of this vade mecum of medical authors is considerably changed from its predecessor. The present work is much larger, contains a considerable amount of new material, while the remaining portions are extensively revised. But the dominant theme remains unaltered: how to make medical writing more easy.

Such a book should rightly be written from the standpoint of the editor rather than the author, and for such a task no one is more eminently fitted than Dr. Fishbein, with his vast experience in this field. With tempered judgment and keen humor the author has analyzed the subject of preparing a medical manuscript. Moreover, he has done this in such a manner that he has converted a seemingly dry theme into a delightful presentation, as well as a most useful one. This book is truly indispensable for anyone embarking upon the sea of medical writing.

Handbook of Orthopedic Surgery. By A. R. Shands, Jr., Ed. 3, St. Louis, The C. V. Mosby Company, 1948.

Although some of the material has been revised, based on experience derived from World War II, the book is essentially unchanged in the present edition. In accordance with the Undergraduate Instruction Committee of the American Orthopedic Association, the contents are divided into 24 chapters, each of which could be used as a basis for a one-hour instruction period. Most medical schools have been quick to seize upon this method in planning the orthopedic curriculum.

Such a concise text must inevitably have its shortcomings. Illustrations are scanty; operative technic is only briefly outlined; many items which strictly should be considered in an orthopedic light are omitted; and finally historical or other relevant data are not mentioned. But perhaps it would be unfair to expect more from this handbook, considering the strict limitations self-imposed by Shands, in striving to make this a teaching text for medical students. For this purpose it is unreservedly endorsed.

Fractures and Dislocations. By Edwin O. Geckeler, Ed. 4, Baltimore, The Williams & Wilkins Company, 1948. This handbook on acute fractures and dislocations has found a great deal of favor with both the undergraduate and the general practitioner, as attested to by the issue of this fourth edition since 1937. This is not surprising for Geckeler has specifically designed his work to meet the needs of the family physician, stressing the principles of early diagnosis, emergency treatment, transportation and closed reduction. The writing is clear, the instructions are precise, and the illustrations complement the text in an admirable manner.

It follows that in such a book as this there is no place for detailed accounts of operative technic, in keeping with the aims of the author. To further simplify the work, only one form of treatment is described for each condition. While it must be granted that the author's choice of treatment is usually a sound one, it is doubtful whether all orthopedic surgeons would be in agreement with the course of management advocated by Geckeler. One could hardly expect complete agreement of ideas in the treatment of fresh fractures and dislocations, and certainly the author's recommendations are well within the technical reach of the average physician. To this degree, Geckeler is supplying a long-felt need, that is, he is restoring the treatment of simple derangements of the skeletal system to the realm of the general practitioner where it rightly belongs.

Operative Gynecology. By Harry S. Crossen and Robert J. Crossen, Ed. 6, St. Louis, The C. V. Mosby Company, 1948. This text has been a well-known reference book to gynecologists and general surgeons for almost 35 years. It follows that there remains little more that can be said about it except that this sixth edition retains the general excellence that has prevailed in its predecessors.

In keeping with the current trend of cancer prevention, the authors stress the need for removal of foci subject to chronic irritation, such as cervicitis, kraurosis, leukoplakia, etc. They also make a strong plea for radical removal of uterus and ovary, when feasible, in performing surgery on women of the so-called cancer age who present symptoms. Similarly, they emphasize the value of curettage and radium insertion when surgery is contraindicated. In this connection, the authors have devoted detailed sections to the subject of radium treatment in cases of malignancy and nonmalignancy.

Diagnosis in Gynaecology. By James U. Ricci, Philadelphia, The Blakiston Company, 1948. This work might well be subtitled "A Handbook of Gynaecologic Diagnosis," for such it is and nothing more. All therapeutic discussions are rigorously avoided.

Preliminary chapters present anatomic and physiologic considerations of the female pelvic tract. The main matter of the text is a brief compendium of the assorted lesions affecting the various female genitalia classified on etiologic grounds and taken up in anatomic progression, starting with the vulvoperineum and ending with the parovarium.

It follows that there is some degree of repetition in the text. Thus, we meet with endometriosis in the sections on the vagina, uterus, tubes, ovaries, and finally genital ligaments, and so with other diseases. The reviewer cannot help but conclude that the subject matter could have been handled more logically if classified on a pathogenetic rather than an etiologic basis, the former being the system commonly employed in the larger treatises on gynecology.

There are no illustrations, and the presentation is dry.

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Lord, Jere W., Jr., 297 (June)

MacCarty, William C., Sr., 546 (Dec.)
Mandl, Felix, 351 (Aug.)
Manzanilla, Manuel A. *See* Fonseca, Francisco
Maxeiner, Stanley, 171 (Apr.)
McCaffery, R., 68 (Feb.)
McCallister, John W., 575 (Dec.)
McKay, Edward R. *See* Bacon, Harry E.
Mendillo, Anthony J., and J. Kertesz, 293 (June)
Mes, G. M., 270 (June)
Meyer, Karl A., 131 (Apr.)
Meyerding, Henry W., and John G. Shellito, 595 (Dec.)

Novak, Emil, 9 (Feb.)

Oberhelman, Harry A., and John B. Condon, 570 (Dec.)
Orbach, Egmont J., 396 (Aug.)

Pick, J. F., 315 (June)
Protzel, C. A., and P. Icochea, 325 (June)

Rademaker, Lee, 194 (Apr.)
Ricketts, William E., 425 (Aug.)
River, Louis P., 320 (June)
Rojas, Ernesto S., 221 (Apr.)
Rose, Thomas E., 55 (Feb.)
Rosser, Curtice, 17 (Feb.)
Rowe, R. J. *See* Bacon, Harry E.

Saltzstein, Harry C., and Vernon B. Blaha, 480 (Oct.)
Schapiro, Mark M., 96 (Feb.)
Schlaepfer, Karl, 288 (June)
Schrey, Edward L. *See* Scuderi, Carlo
Scuderi, Carlo, and Edward L. Schrey, 623 (Dec.)
Seshachalam, T., 208 (Apr.)

Shap
Shell
Sinai
Soro,
Stein,
Strau

Taub
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Voris,

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Schrey, Edward L. *See* Scuderi, Carlo
Scuderi, Carlo, and Edward L. Schrey, 623 (Dec.)
Seshachalam, T., 208 (Apr.)
Shapiro, Jake, 421 (Aug.)
Shellito, John C. *See* Meyerding, Henry W.
Sinaiko, E. S., 62 (Feb.)
Soro, Yrjö, 464 (Oct.)
Stein, I. F., Jr., 131 (Apr.)
Strauss, Alfred A., 178 (Apr.)

Tauber, Robert, 200 (Apr.)
Thorek, Philip, 578 (Dec.)

Ufano, A. D., 101 (Feb.)

Voris, Harold C., 634 (Dec.)

Watts, James W., and W. Freeman, 343 (Aug.)
White, Charles Stanley, 303 (June)
Wilensky, Abraham O., 73 (Feb.), 331 (E) (June), 525 (E) (Oct.)
Willner, Philip, 359 (Aug.)

Zander, Edwin L., 149 (Apr.)
Zitman, Irving, 62 (Feb.)
Zuckerman, I. C., 89 (Feb.)